

Draft Health and Safety Plan

***Time Critical
Removal Action for the Refuse Area at
the Georgia-Pacific Corporation
Kalamazoo Mill Property and the
Oxbow Area at the
Former Hawthorne Mill Property***

**Allied Paper, Inc./Portage
Creek/Kalamazoo River
Superfund Site
Kalamazoo, Michigan**

September 2006

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1. Introduction

1.1 Objective

This document presents the *Health and Safety Plan* (HASP), which has been prepared in support of the removal of paper-making residuals (residuals) and soils that contain, or may potentially contain, polychlorinated biphenyls (PCB) from the Refuse Area at the Georgia-Pacific Corporation (Georgia-Pacific) Kalamazoo Mill Property (Kalamazoo Mill Property) and the Oxbow Area at the former Hawthorne Mill Property (Oxbow Area), as described in the *Draft Time Critical Removal Action (TCRA) Work Plan* (Work Plan). These two properties are collectively referred to as the Mill Properties, and are associated with the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Superfund Site) located in Kalamazoo, Michigan. This HASP has been prepared consistent with the Administrative Settlement Agreement and Order on Consent for a Removal Action (Settlement Agreement). As discussed in the Work Plan, removal activities will include, but may not be limited to, the following:

- mobilization;
- clearing and grubbing;
- excavation;
- waste handling and loading;
- field sampling;
- site restoration;
- decontamination; and
- demobilization.

The Settlement Agreement requires the removal, to the extent feasible, of PCB-containing residuals and soils at the Oxbow and Refuse Areas; while not required by United States Environmental Protection Agency (USEPA), Georgia Pacific will also contemporaneously remove and dispose of soils that contain or may potentially contain PCB from a wastewater pipeline and an electrical Transformer Pad located on the Kalamazoo Mill Property. Therefore, the Work Areas include the Oxbow Area, Refuse Area, wastewater pipeline, and the electrical Transformer Pad.

Based on historical sampling conducted and similar historical construction activities (*Georgia-Pacific Corporation Kalamazoo Paper Mill Property Divestiture Study – Supporting Materials* [March 2003]; *Georgia-Pacific Corporation Former Hawthorne Mill Investigation-Related Documents* [November 2005]), PCB is the only known constituent of concern (COC) at the removal areas. However, historical disposal activities at the Refuse Area allow for the potential to encounter additional volatile organic compounds. Air monitoring, will be conducted as a control measure, as described in Section 6.0.

The objective of this HASP is to provide a mechanism for establishing safe working conditions for personnel at the site. The Safety organization (personnel roles and responsibilities), procedures, and protective equipment have been established based on an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incident.

1.2 Site Description

The Kalamazoo Mill Property comprises approximately 45 acres in Kalamazoo County, Michigan (Figure 1). The Kalamazoo Mill Property is bounded on the south by King Highway, on the north by railroad tracks and commercial properties, on the west by the Kalamazoo River, and on the east by the former Hawthorne Mill Property. The Kalamazoo Mill Property was originally owned by Wolverine Paper Company until it was sold to the Kalamazoo Paper Company in 1899, and later purchased by Georgia-Pacific in 1967. The Kalamazoo Mill Property originally consisted of three paper mills (i.e., Mills 1, 2, and 3) and two coating mills (i.e., Mills 4 and 5). Mills 2 and 5 were razed in the 1970s and 1980s, respectively. Georgia-Pacific operated the mills between 1967 and 2000.

The former Hawthorne Mill Property is adjacent to, and directly east of, the Kalamazoo Mill Property (Figure 1). The former Hawthorne Mill, located along the western edge of the former Hawthorne Mill Property, was used for papermaking operations between 1911 and 1976. Between 1911 and 1976, prior to Georgia-Pacific owning the property, waste paper residuals were disposed of in an area south of the former Hawthorne Mill referred to as the Oxbow Area. Georgia-Pacific purchased the former Hawthorne Mill Property in 1976.

1.3 Policy Statement

Activities conducted will be carried out in a manner that protects the safety and health of onsite workers, including contractors and subcontractors. The basic provisions of this site-wide HASP apply to all onsite personnel. This HASP provides a minimum standard of compliance, however, contractors and subcontractors must develop and abide by their own HASP, the requirements of which will be equivalent to, or more stringent than, those of this HASP.

1.4 Compliance with Applicable Regulations and Guidelines

This HASP complies with applicable OSHA regulations, and USEPA regulations. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, National Institute for Occupational Safety and Health (NIOSH), OSHA, United States Coast Guard (USCG), USEPA (86116, October 1985).
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1910.
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, Department of Health and Human Services (DHHS), Center for Disease Control (CDC), NIOSH (2005).
- *Threshold Limit Values*, American Conference of Governmental Industrial Hygienists (ACGIH) (2006).
- *Guide to Occupational Exposure Values*, ACGIH (2006).

- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

1.5 Definitions

The following definitions (listed alphabetically) are applicable to this HASP:

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Contractor* – Any entity directly hired by Georgia-Pacific or any other subcontractor to perform onsite activity.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be, present and pose an exposure hazard to onsite personnel.
- *Incident* - All losses, including first aid cases, injuries, illnesses, near misses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *Mill Properties* – Comprising the Kalamazoo Mill Property and the Former Hawthorne Mill Property.
- *Near Miss* - An incident in which no injury; illness; motor vehicle accident; equipment, property, or other damage occurred, but that could have occurred under slightly different circumstances.
- *Onsite Personnel* - All contractors and subcontractor personnel involved with onsite activities.
- *Oxbow Area* – Eastern portion of the Former Hawthorne Mill where removal activities are to be performed.
- *Project* - All onsite work performed under the scope of work.
- *Refuse Area* – Western portion of the Kalamazoo Mill where removal activities are to be performed.
- *Subcontractor* - Includes personnel hired by a direct contractor of Georgia-Pacific.
- *Support Zone (SZ)* - All areas of the site, except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Visitor* - All other personnel, except the onsite personnel.
- *Work Area* - The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area on the site that is not contaminated, or suspected of being contaminated, the entire work area may be a SZ.

1.6 Acronyms

The following acronyms (listed alphabetically) are applicable to this HASP:

- *ACGIH* - American Conference of Governmental Industrial Hygienists
- *ANSI* – American National Standards Institute
- *CDC* – Center for Disease Control
- *CERCLA* – Comprehensive Environmental Response, Compensation and Liability Act.
- *CFR* – Code of Federal Regulations
- *CO* – Carbon Monoxide
- *COC* - Constituent(s) of Concern
- *CPR* - Cardiovascular Resuscitation
- *CRZ* - Contamination Reduction Zone
- *dBA* – Decibels Adjusted
- *DEET* - Diethyltoluamide
- *DHHS* – Department of Health and Human Services
- *DOT* - Department of Transportation
- *EMS* - Emergency Medical Services
- *EZ* - Exclusion Zone
- *FM* - Factory Mutual Engineering Corporation
- *GFCI* - Ground Fault Circuit Interrupter
- *HASP* - Health and Safety Plan
- *HSO* - Health and Safety Officer
- *HSS* - Health and Safety Supervisor
- *II* - Incident Investigation
- *LEL* - Lower Explosive Limit

- *LOTO* – Lockout/Tagout
- *LP* – Liquified Petroleum
- *MIOSHA* – Michigan Occupational Safety and Health Administration
- *MSDS* - Material Safety Data Sheet
- *NEC* - National Electrical Code
- *NESC* - National Electrical Safety Code
- *NIOSH* - National Institute for Occupational Safety and Health
- *NRR* – Noise Reduction Rating
- *OSC* – On-Scene Coordinator
- *OSHA* - Occupational Safety and Health Administration
- *PCB* – Polychlorinated biphenyls
- *PEL* - Permissible Exposure Limit
- *PFD* – Personal Flotation Devices
- *PID* - Photoionization Detector
- *PM* - Project Manager
- *PPE* - Personal Protective Equipment
- *ppm* – parts per million
- *RMSF* – Rocky Mountain Spotted Fever
- *PVC* - Polyvinyl Chloride
- *SS* - Site Supervisor
- *SZ* - Support Zone
- *TCRA* – Time Critical Removal Action
- *TLV* - Threshold Limit Value
- *TSA* - Task Safety Analysis

- *UL* - Underwriters Laboratories
- *USCG* - United States Coast Guard
- *USEPA* - United States Environmental Protection Agency

2. Roles and Responsibilities

2.1 Project Personnel

Onsite personnel will adhere to the procedures outlined in this HASP, as reflected in each contractor's HASP, during the performance of their work. Each person is responsible for completing tasks safely and for reporting unsafe acts or conditions to his/her supervisor. A person may not work in a manner that is in conflict with these procedures. The Georgia-Pacific Project Manager (PM) may dismiss from the project any person who violates safety procedures.

Onsite personnel will have with them documentation of training in accordance with applicable regulations and be familiar with the requirements and procedures contained in their contractor's HASP (which will, at a minimum, include those contained in this HASP) prior to initiating activities. In addition, onsite personnel will attend an initial hazard briefing prior to beginning work, as well as daily safety meetings. Onsite personnel will also meet training and medical surveillance requirements; including at a minimum, those discussed in Section 8 (Training and Medical Surveillance) of this HASP.

Contractors and subcontractors conducting work at the site are responsible for the protection, health, and safety of their own employees. As such, each company's HASP will clearly identify the lines of authority for health and safety within their organization. The company will also evaluate whether the health and safety procedures outlined in this HASP are appropriate for those activities, and meet the requirements of their company's health and safety standards.

Onsite personnel will read and acknowledge their understanding of the contractor's HASP before commencing work, and abide by the minimum requirements of the HASP. Each contractor will require onsite personnel to sign a HASP Acknowledgement Form (see Attachment A for an example) after reviewing their HASP.

Onsite personnel will immediately report the following to the Site Supervisor (SS) or the Health and Safety Supervisor (HSS):

- personal injuries and illnesses, no matter how minor;
- unexpected or uncontrolled release of chemical substances;
- symptoms of chemical exposure;
- unsafe or hazardous situations;
- unsafe or malfunctioning equipment;
- changes in site conditions that may affect the health and safety of project personnel;
- damage to equipment or property;
- situations or activities for which project personnel are not properly trained; and
- near misses.

The health and safety position requirements and lines of authority are described below. Compliance with this document requires that the company provide names and qualifications for those assuming the roles of PM, Health and Safety Officer (HSO), HSS, and SS. In some firms, it is not uncommon for the duties of the HSO to be carried out by the PM. This is acceptable, provided that the PM has the required knowledge, training, and experience to properly address all hazards associated with the work, and to prepare, approve, and oversee the execution of the firm's site-specific HASP. A subcontractor may designate the same person to perform the duties of both the HSS and the SS. However, depending on the level of complexity of a contractor's scope of work, it may be infeasible for one person to perform both functions satisfactorily.

Names and associated assignments will be presented to Georgia-Pacific (or their representative) prior to the initial health and safety briefing. Once Georgia-Pacific accepts such assignments, a table showing the key personnel (including title/role, name, and contact information) will be completed and shared with onsite personnel (see Table 2-1 at the end of this section for an example).

2.1.1 Contractor Health and Safety Officer

Each contractor must designate an HSO to assume overall responsibility for the technical health and safety aspects of the project, including review and approval of the contractor's HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSO or his designee must approve changes or addenda to their HASP.

2.1.2 Contractor Project Manager

Each contractor must designate a PM to be responsible for verifying that project activities are completed in accordance with the requirements of their HASP. The PM is responsible for confirming that the SS has the equipment, materials, and qualified personnel to fully implement the safety requirements of their HASP, and/or that contractors and subcontractors meet the requirements established in their HASP (which will meet the minimum standards of this HASP). It is also the responsibility of the PM to:

- Consult with the HSO on onsite health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;
- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications to their HASP; and
- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

2.1.3 Contractor Health and Safety Supervisor

Each contractor must designate an HSS to be responsible for field health and safety issues, including ensuring that the minimum requirements of this HASP are addressed in the contractor's HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be

addressed to this individual. The HSS will advise the PM on health and safety issues. Each contractor's HSS is the primary site contact for that organization on health and safety matters. It is the responsibility of the HSS to:

- Provide onsite technical assistance, if necessary;
- Participate in all incident investigations (IIs) and confirm that they are reported to the HSO and PM within 24 hours;
- Coordinate site air sampling and dust monitoring – during excavation and disposal activities, including equipment maintenance and calibration;
- Conduct site safety orientation training and safety meetings;
- Verify that onsite personnel have received the required physical examinations and medical certifications;
- Review site activities with respect to compliance with their HASP;
- Maintain required health and safety documents and records;
- Assist the SS in instructing field personnel on project hazards and protective procedures; and
- Notify local public emergency representatives (as appropriate) of the nature of the site operations, and post their telephone numbers (e.g., local fire department personnel who would respond for a confined space rescue). This duty may be shared with the SS.

2.1.4 Contractor's Site Supervisor

Each contractor must designate an SS to be responsible for implementing their HASP, including communicating requirements to onsite personnel. The SS will be responsible for informing the PM of changes in the Work Plan, procedures, or site conditions so that those changes may be addressed in their HASP. Other responsibilities are to:

- Consult with the HSS on onsite health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map and determine and post emergency telephone numbers and routes to medical facilities;
- Observe onsite project personnel for signs of ill health effects;
- Investigate and report any incidents to the HSS;
- Verify that all onsite personnel have had applicable training; and
- Verify that onsite personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control those hazards.

2.2 All Onsite Personnel

Each contractor will ensure that all onsite personnel read and acknowledge their understanding of the HASP before commencing work, and abide by the requirements of the plan. All onsite personnel shall sign the HASP Acknowledgement Form following review of their respective contractor's HASP.

All personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in their HASP (including, at a minimum, those in the HASP) prior to initiating site activities. In addition, all onsite personnel will attend an initial hazard briefing prior to beginning work at the site, as well as the daily safety meetings.

Onsite personnel will immediately report the following to the SS or HSS:

- Personal injuries and illnesses no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or hazardous situations;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property;
- Situations or activities for which they are not properly trained; and
- Near misses.

2.3 Visitors

All visitors to work areas must check in with the SS. Visitors will be cautioned to avoid skin contact with surfaces, soils, groundwater, or other materials that may be impacted or be suspected to be impacted by PCB. All visitors must read and acknowledge their understanding of the contractor's HASP before commencing work and abide by the requirements of the plan. All visitors shall sign the HASP Acknowledgement Form following their review of the HASP.

Visitors requesting to observe work at the site must don appropriate personal protective equipment (PPE) prior to entry to the work area and must have the appropriate training and medical clearances to do so. If respiratory protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit-tested for a respirator within the past 12 months.

2.4 Stop Work Authority

All onsite personnel are empowered and have the responsibility to stop the work of another co-worker if the working conditions or behaviors are considered unsafe.

**TABLE 2-1
KEY PERSONNEL**

Title/Role	Name	Mailing Address	Phone	Email
Client Personnel				
Regulatory Agency Personnel				
Contractor Personnel				
Project Manager				
Health and Safety Officer				
Health and Safety Supervisor				
Site Supervisor				
Subcontractor Personnel				

3. Project Hazards and Control Measures

3.1 Scope of Work

The field activities will include, but may not be limited to, the following tasks:

- mobilization;
- clearing and grubbing;
- excavation and disposal;
- waste handling and loading;
- site restoration;
- decontamination;
- demobilization;
- field sampling; and
- construction oversight.

The hazards and control techniques specific to each task are presented in the following sections.

The contractor's HSS and SS must continually monitor all operations (via journals, inspections, audits, safety meetings, etc.) to provide compliance with the minimum requirements of this HASP and ultimately those of the contractor's HASP.

3.2 Field Activities, Hazards, and Control Procedures

The following task safety analyses (TSAs) identify potential health, safety, and environmental hazards associated with each type of field activity. Because of the complex and changing nature of field projects, supervisors must continually inspect the site to identify hazards that may affect onsite personnel, the community, or the environment. Contractor SSs must be aware of these changing conditions and discuss them with the appropriate PM whenever these changes impact employee health, safety, the environment, or performance of the project. The contractor SSs will keep onsite personnel informed of the changing conditions, the HSO and PM will write and/or approve addenda or revisions to their HASP, as necessary.

3.2.1 Mobilization

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121(e)(1), since all removal activities will be conducted onsite and consistent with the Settlement Agreement, permits are not required. Substantive requirements will be achieved to the extent practicable, as determined by the USEPA.

Site mobilization and area reconnaissance will include establishing staging and decontamination locations, determining the location of utilities and other installations, and establishing work areas. Mobilization may also include setting up equipment and establishing a temporary site office. A break area will be set up outside regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ.

During this initial phase, the contractor's PM will walk the site daily to confirm the existence of anticipated hazards and to identify safety and health issues that may have arisen since the writing of the plan. The associated hazards with mobilization are heavy equipment operation, manual materials handling, installation of temporary onsite facilities, and manual site preparation.

Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Installation of temporary field office and support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to the manual lifting and moving of materials. The work area may presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy or snowy weather may cause wet, muddy, slick walking surfaces and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants such as poison ivy and poison oak; aggressive fauna such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather such as sunburn, lightning, rain, and heat- or cold-related illnesses; and pathogens such as rabies, Lyme disease, and blood-borne pathogens.

Control procedures for these hazards are discussed in Section 4, General Safety Practices. In addition, the following precautions will be followed:

- The buddy system will be utilized at all times;
- American National Standards Institute(ANSI-41) approved safety footwear with a rugged sole will be used;
- Everyone who enters an unlighted area will have a flashlight or other portable light source available;
- Entrants will continually monitor their location and be aware of the closest exit route;
- Entrants will avoid contact with any biological waste material and will utilize universal precautions (personal protective equipment [PPE], personal hygiene, training) in the event that handling or sampling is necessary; and
- A system to communicate will be available (radio or cellular phone).

3.2.2 Clearing and Grubbing

The proposed excavation areas - Refuse Area and Oxbow Area and contemporaneously the wastewater pipeline and electrical transformer pad - will be marked in the field prior to any other fieldwork in order to identify any hazards that may be present.

The physical hazards involved with construction and removal relate to work done with heavy equipment, hand tools, and the environment itself. There exists a potential for incidents involving personnel struck by or struck against powered equipment, timber, or materials, which could result in fractures, cuts, punctures, or abrasions. Walking and working surfaces during construction activities may involve slip, trip, and fall hazards. Working at elevations may also create a fall hazard.

Uneven terrain and slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect the area in which they are working and keep the area as clear as possible.

Onsite workers are exposed to serious hazards during construction and excavation when using powered equipment. Workers may be struck by blades or by material thrown by powered equipment.

The most common type of accident that occurs in material-handling operations is the “caught between” situation when a load is being handled, and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique must be employed, and mechanical means must be used to lift objects whenever possible.

Due to the type of work involved in clearing and grubbing, the primary health hazards involve potential exposure to site contaminants, repetitive motion disorders, lifting, and other ergonomic stressors. Noise may also present a hazard. Operation of heavy equipment and power-actuated and pneumatic hand tools frequently results in high noise levels.

Prior to the start of excavation and removal activities, the operation will be reviewed with all onsite personnel. Hazards will be identified, and protective measures will be explained, including the appropriate level of PPE. Equipment will be inspected and in proper working condition prior to use. Inspections will be conducted at the beginning of each work day and documented on the Equipment Inspection Form (see Attachment B for an example). Employees will receive training to address the equipment and its operation and care. Personnel should be scheduled in a manner to reduce the likelihood of performing repetitive tasks for prolonged periods. Technical assistance should be provided for large lifting tasks. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 decibels (dBA) or a level that commonly results in difficult conversation. Air monitoring (as described in Section 6.0) will be implemented to evaluate the airborne exposure levels and adequacy of specified PPE. Procedures for excavations greater than 4 feet deep are described in Section 3.2.5.

3.2.3 Excavation

Excavation activities will be implemented at the Refuse Area, Oxbow Area, transformer pad, and wastewater pipeline area to remove impacted soil and potentially debris. Excavation activities will be conducted in accordance with this section and all applicable OSHA regulations.

The physical hazards involved in the excavation of soils are related to the excavation itself and the operation of heavy equipment. The presence of overhead utilities such as power lines requires careful positioning of the excavating equipment in order to maintain a safe distance between the lines and the closest part of the equipment. The presence of underground utilities such as gas lines, power lines, water lines, and sewer pipes must be determined prior to beginning the excavation.

Excavations pose significant hazards to onsite personnel if they are not carefully controlled. There exists a chance for the excavation to collapse if it is not dug properly, sloped, benched, or shored as required by 29 CFR 1926 Subpart P. Protective systems, as required by 29 CFR 1926 Subpart P, must be utilized if the potential for hazardous cave-ins exists. The excavation also is a fall hazard, and employees must pay careful attention to what they are doing or they risk a fall into the excavation. Fall protection, as required by 29 CFR 1926 Subpart M, will be required (See Section 4.14.1).

Onsite personnel should not enter excavations unless they are required to do so and no remote options are available. All activities shall be done remotely, without entering the excavation, to the extent feasible.

Noise also may present a hazard. Heavy equipment operation frequently results in noise levels exceeding 85 dBA, potentially requiring the use of hearing protection.

At the end of each work day, open excavations will be marked-off at a minimum, and equipment will be moved to a location away from high-voltage electrical equipment and away from routes necessary to access high-voltage electrical equipment.

Airborne concentrations of PCB in the site soil and the dust from the excavation procedure pose the potential for inhalation exposure. PPE for this phase is described in Section 5, Personal Protective Equipment. Airborne particulate generation will be controlled during site excavations. Dry, dusty soil will be wetted with a water spray from a potable water source to control the generation of dust. Soil will not be wetted to a degree that will cause runoff or erosion.

Before excavation activities commence, the existence and location of underground pipe, electrical equipment, and gas lines shall be determined. This will be done, if possible, by contacting the appropriate client representative and having him/her mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line. An Underground/Overhead Utility Checklist, (an example is presented in Attachment C), shall be used to document that nearby utilities have been marked on the ground and that the excavation areas have been cleared. The completed checklist will be in the possession of the SS prior to commencement of any intrusive investigation.

All excavation activities shall be conducted in accordance with 29 CFR 1926 Subpart P. If excavation operations are located near underground installations, the exact location of the installations must be determined by safe and acceptable means. While the excavation is open, underground installations must be protected, supported, or removed, as necessary, to safeguard employees.

3.2.3.1 Inspections by a Competent Person

Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection must be conducted by the competent person prior to the start of work and as needed throughout the shift (an example Periodic Excavation Inspection Form is presented in Attachment D).

Inspections also must be made after every rainstorm or other hazard-increasing occurrence. These inspections are required only when onsite personnel exposure can be reasonably anticipated. Where the competent person finds evidence of a situation that could result in a possible cave-in, or indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees must be removed from the hazardous area until the necessary precautions have been taken to maintain their safety.

Walkways must be provided where onsite personnel or equipment are required or permitted to cross over excavations. Guardrails that comply with 1926.502(b) must be provided. Adequate barrier protection must be provided at all remotely located excavations.

3.2.3.2 Soil Classification

In the event that an excavation shoring system is necessary, 29 CFR 1926 Subpart P, Appendix A describes methods of classifying soil and rock deposits based onsite and environmental conditions and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils. This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in 1926.652(b)(2) as a method to protect onsite personnel from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with Appendix C to Subpart P of Part 1926, and when aluminum hydraulic shoring is designed in accordance with 29 CFR Subpart P Appendix D. This appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data are predicated on the use of the soil classification system set forth in Appendix A of 29 CFR 1926.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). Short-term exposure means that an excavation is open for a period of time less than or equal to 24 hours. Soil and rock deposits must be classified in accordance with Appendix A to Subpart P of Part 1926. The maximum allowable slope for a soil or rock deposit must be determined. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope that is at least one-half horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with 1926.651(I). Configurations of sloping and benching systems must be in accordance with 29 CFR 1926 Subpart P Appendix B.

3.2.3.3 Overhead Electrical Clearances

In the event that excavation activities are conducted in the vicinity of overhead power lines, the power to the lines must be de-energized, tested de-energized, marked up/guaranteed, and grounded, or the equipment must be positioned such that no part, including excavation boom, can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

If the above minimum clearances cannot be maintained, the following controls shall be instituted at the site to protect against live electrical conductors:

- Portable rubber protective equipment (blankets, hose, hoods, etc.) and/or barriers of approved material shall be placed to completely eliminate any possibility of contact with exposed live parts.

- When placing and removing protective equipment, and until and unless such complete protection is provided, workers shall wear the necessary personal protective equipment, including approved insulating gloves with arm gauntlets, hard hat, and body protection.

3.2.3.4 Excavation Entry Procedure

Persons entering an excavation must do so under controlled conditions. The excavation must be properly sloped, benched, or shored, and ladders or ramps must be available every 25 feet laterally in the excavation. Each entry shall have an attendant who observes the entrant(s) and is prepared to render assistance.

Duties of Workers Entering an Excavation

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure to site COCs;
- Communicate with the attendant, as necessary, to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space;
- Alert the attendant whenever:
 - the entrant recognizes any warning sign or symptom of exposure to a dangerous situation; or
 - the entrant detects a prohibited condition;
- Exit from the excavation as quickly as possible whenever:
 - an order to evacuate is given by the attendant or the supervisor;
 - the entrant recognizes any warning sign or symptom of exposure to a dangerous situation; or
 - the entrant detects a prohibited condition.

Duties of Attendants

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure to site contaminants;
- Continuously maintains a count of entrants in the excavation;
- Remains outside the excavation during entry operations until relieved by another attendant;
- Communicates with authorized entrants as necessary to monitor entrant status to alert entrants of the need to evacuate the excavation under any of the following conditions:
 - the attendant detects a prohibited condition;
 - the attendant detects the behavioral effects of hazard exposure in an entrant;
 - the attendant detects a situation outside the excavation that could endanger the entrants; or
 - the attendant cannot effectively and safely perform his/her duties; and

- Summon rescue and other emergency services if the attendant determines that entrants may need assistance to evacuate the excavation.

3.2.4 Material Handling & Loading

The physical hazards involved with material loading relate to work done with heavy equipment, limited clearance, and the environment itself. There exists a potential for incidents involving onsite personnel struck by or struck against powered equipment, timber, or materials, which could result in fractures, cuts, punctures, or abrasions. Walking and working surfaces during construction activities may involve slip, trip, and fall hazards. Working at elevations may also create a fall hazard.

Uneven terrain and slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect the area in which they are working, and keep the area as clear as possible.

Site workers are exposed to serious hazards during construction and excavation when using powered equipment. Workers may be struck by blades or by material thrown by powered equipment.

The most common type of accident that occurs in material-handling operations is the “caught between” situation when a load is being handled, and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique must be employed, and mechanical means must be used to lift objects whenever possible.

Due to the type of work involved in removal activities, the primary health hazards involve potential exposure to site contaminants, repetitive motion disorders, lifting, and other ergonomic stressors. Noise may also present a hazard. Operation of heavy equipment and power-actuated and pneumatic hand tools frequently results in high noise levels.

Prior to the start of material removal activities, the operation will be reviewed with all employees. Hazards will be identified, and protective measures will be explained, including the appropriate level of PPE. Equipment will be inspected and in proper working condition prior to use. A clear line of sight and/or a means of communication will be maintained between onsite personnel and the equipment operator at all times. Inspections will be conducted at the beginning of each shift and documented on the attached Equipment Inspection Form (Attachment B). Employees will receive training to address the equipment and its operation and care. Personnel should be scheduled in a manner to reduce the likelihood of performing repetitive tasks for prolonged periods. Technical assistance should be provided for large lifting tasks. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 dBA or a level that commonly results in difficult conversation. Air monitoring (as described in Section 6.0) will be implemented to evaluate the airborne exposure levels and adequacy of specified PPE.

3.2.5 Site Restoration

Site restoration will involve cleanup and removal of PCB-impacted materials with an excavator and manual loading, as appropriate. After complete removal of PCB-impacted materials, clean fill will be used to backfill each area as described in the TCRA Work Plan. After all areas have been backfilled, the areas will be revegetated as necessary.

The primary physical hazards associated with this task include working with relatively large heavy equipment. Ergonomic strain from forceful exertion and awkward posture will pose a risk to affected employees.

There is very limited risk of exposure to hazardous materials from this task. Health hazards are primarily associated with heat stress and physical activity.

Prior to the start of restoration activities, the operation will be reviewed with all onsite personnel. Hazards will be identified, and protective measures will be explained, including the appropriate level of PPE. Equipment will be inspected and in proper working condition prior to use. Inspections will be conducted at the beginning of each work day and documented on the Equipment Inspection Form (Attachment B). Employees will receive training to address the equipment and its operation and care. Personnel should be scheduled in a manner to reduce the likelihood of performing repetitive tasks for prolonged periods. Technical assistance should be provided for large lifting tasks. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 dBA or a level that commonly results in difficult conversation. Air monitoring (as described in Section 6.0) will be implemented to evaluate the airborne exposure levels and adequacy of specified PPE.

3.2.6 Drum Handling Procedures

It may be necessary to stage waste drums throughout the area to containerize waste materials for subsequent disposal. These drums will be removed for disposal to an offsite facility by the waste hauler. It is anticipated that all materials will be handled in bulk containers; however, if waste drums are required, the following procedures will be followed.

The physical hazards involved with drum handling relate to work done with powered equipment, hand tools, or a drum truck. There exists a potential for incidents involving personnel struck by or struck against powered equipment, a drum truck, or drums, which could result in fractures, cuts, punctures, or abrasions. Additionally, drum contents could spill causing potential exposure to nearby workers.

Site workers are exposed to serious hazards during drum moving when using powered equipment. Workers may be struck by machinery or by the drums carried by the machinery. Workers will remain in view of the machine operator and will remain outside the swing area. Drums carried by heavy machinery will be secured in the machine's bucket by using a rope or other means.

The most common type of accident that occurs in drum-handling operations is the "caught between" situation when a load is being handled, and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading drums. Proper lifting technique must be employed, and mechanical means must be used to lift drums whenever possible. To minimize the potential of injuries, drums weighing more than 40 pounds will be handled using a drum truck or powered equipment.

Due to the type of work involved in drum handling activities, the primary health hazards involve repetitive motion disorders, lifting, and other ergonomic stressors and inadvertent contact to drum contents. Drums will be moved slowly and deliberately. PPE worn by drum handlers will consist of Modified Level D initially if drums are intact and could progress to Level C or Level B based upon the presence of damaged/leaking drums.

Prior to the start of material handling activities, the operation will be explained to all employees. Hazards will be identified, and protective measures will be explained. Equipment will be inspected and in proper working condition. Employees should receive training to address the equipment and its operation and care. Personnel

should be scheduled in a manner to reduce the likelihood of performing repetitive tasks for prolonged periods. Mechanical means of lifting and moving material should be substituted for manual movement of material whenever possible.

Each contractor HSS will be responsible for the activities of their employees while onsite.

3.2.7 Equipment Decontamination

All equipment will be decontaminated before it is removed from the site; visual inspections will be conducted to verify that potential PCB-impacted material has been removed. In addition, all operations that have the potential to generate or release hazardous material will be conducted in a controlled area using the appropriate engineering controls. Specific decontamination techniques will be established based on site conditions. Decontamination procedures will be reviewed with all onsite personnel. The construction of a decontamination pad on a suitable surface (concrete or paved area) with polyethylene sheeting or other appropriate containment system is anticipated. Pressure washing with manual scrub brushing, as needed, will be used to decontaminate equipment. PCB-impacted equipment will be determined "clean" through visual inspection of all equipment.

The decontamination facility will be inspected on a daily basis for evidence of leaks or loss of integrity to the containment system. If any deficiencies are noted, they will be corrected immediately and documented (e.g., in a daily project report, fieldbook, etc). All wastewater that is generated onsite will be treated, tested, and discharged onsite as described in the TCRA Work Plan.

Personnel involved in decontamination activities may be exposed to skin contact with contaminated materials. All personnel will review the operating procedures and PPE prior to decontamination. The pressure washer and decontamination containment facility will be inspected daily prior to use. Personnel involved in decontamination activities must wear PPE that is one level below the level worn by personnel working in the EZ.

3.2.8 Engineering Observation

Engineering observation activities may involve a potential for exposure to physical and health hazards. Hazards may be associated with the site, the equipment being used, and environmental conditions.

There exists a potential for incidents involving personnel being struck by or struck against equipment or objects, which could result in fractures, lacerations, punctures, or abrasions. Walking and working surfaces during activities may involve slip, trip, or fall hazards. Slippery walking/working surfaces can increase the possibility of back injuries, overexertion injuries, and slips and falls. Material-handling operations may result in "caught between" situation when a load is being handled, and a finger or toe gets caught between two objects. Material handling also exposes employees to sprains/strains if proper lifting techniques are not used. Noise may also present a hazard. Heavy equipment operation frequently results in high noise levels.

Environmental hazards include plants such as poison ivy and poison oak; aggressive fauna such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather such as sunburn, lightning, rain, and heat-related illnesses; and pathogens such as rabies, Lyme disease, and blood-borne pathogens.

Prior to the start of any field activity, the site conditions will be discussed with all affected onsite personnel. Hazards will be identified, and protective measures will be explained. Control procedures for these hazards are

discussed in Section 4, General Safety Practices, and in task-specific sections of this HASP. Decisions regarding PPE will be based on the potential chemical and physical hazards onsite, and measurements and observations made prior to and during work activities. A minimum of Level D protection will be worn by personnel conducting observation activities. See Section 5, Personal Protective Equipment, for a description of PPE requirements. Personnel conducting observation activities will do so from a safe distance.

3.2.9 General Construction Hazards and Control Procedures

Construction activities involve a potential for exposure to many physical and health hazards.

The physical hazards involved with construction activities relate to the work conducted with heavy equipment, hand and power tools, and the construction environment itself. During construction-related activities there exists a potential for incidents involving personnel being struck by or against equipment or materials, which may result in fractures, lacerations, punctures, and abrasions. Walking and working surfaces during construction activities may present slip, trip, or fall hazards. Slippery surfaces can increase the likelihood of slips and falls, as well as back and overexertion injuries. Hot work activities such as cutting and welding may present the risk of a fire or explosion hazard. Overhead hazards such as electrical conduit or process piping may be present due to elevated work.

In the event of operations on elevated surfaces workers may be exposed to falls if the proper fall protection system is not used (see Section 4.14.1 – Fall Protection). Work from ladders, scaffolding, and aerial lifts also exposes onsite personnel to fall hazards and injuries if the equipment is used improperly or onsite personnel are not trained in the equipment's safe use.

Electricity may pose a hazard to onsite personnel during the use of portable electrical equipment and lead cords. Sources of energy that are not locked out and/or tagged out expose personnel to various forms of energy (e.g., electrical, mechanical, high pressure) that could be hazardous during the performance of construction tasks. Additionally, employees installing temporary and permanent wiring are exposed to electrical hazards if proper precautions and procedures are not followed, or if inexperienced or unqualified personnel conduct the work.

Improper operation of heavy equipment (e.g., front end loaders, aerial lifts, cranes) may result in personnel being struck by the equipment or loads being handled, and could result in contusions, fractures, and lacerations. Personnel may be injured and equipment damaged if it is not used for the purpose intended, overloaded, or used improperly by inexperienced or unauthorized individuals. Loads being lifted by cranes may shift, causing them to fall and strike personnel and possibly cause serious injury or death. Excavations present entrapment and fall hazards to personnel working in or near them.

Due to the type of work involved in many construction activities, the primary health hazards involve repetitive motion, lifting, and other ergonomic stresses. Noise may also present a hazard to employees exposed to high decibel levels. Operation of heavy equipment, power tools, pneumatic tools, and power-actuated tools often results in high noise levels. Exposure to construction materials that may release harmful vapors during their use and curing periods are also possible. Personnel may be exposed to hazardous or toxic vapors created during hot work activities.

Prior to the start of any field activity, the site conditions will be discussed with all affected personnel. Hazards will be identified, and protective measures will be explained. Equipment will be inspected prior to usage and be in proper working condition. Employees will receive training in the use and care of equipment that they will be expected to operate. Tasks should be scheduled in a manner that reduces the likelihood of performing a

repetitive task for prolonged periods. Proper lifting techniques should be employed, and mechanical means should be used for heavy lifting tasks. All tasks requiring the use of a crane or rigging will be done in accordance with 29 CFR 1926 Subpart N. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 dBA or a level that commonly results in difficult conversation. Excavations will be done in accordance with all state and federal regulations and Section 3.2.3 of this HASP.

Control procedures for general electrical hazards are discussed in Section 4.11, Electrical Safety. Control procedures for hot work are discussed in Section 4.16, Hot Work Safety Program. Safety during elevated work will conform to the requirements of 29 CFR 1926 Subpart M, Fall Protection. Safety procedures governing the use of scaffolding and aerial lifts and the use of ladders shall conform to the requirements of 29 CFR 1926 Subpart L, Scaffolds, and Subpart X, Stairways and Ladders, respectively.

Lockout/tagout procedures as specified in 29 CFR 1910.147 shall be followed by personnel who may be exposed to hazardous energy sources. Line-breaking activities shall follow all required procedures and regulations (lockout/tagout) and be performed under the supervision of a competent person.

3.2.10 Field Sampling

3.2.10.1 Soil and Air Sampling

This task involves collecting soil and air samples for the evaluation of potential impacts by PCB. The physical hazards of these operations are primarily associated with the sample collection methods and procedures used. In addition, personnel may be exposed to hazards associated with working in or near excavations and heavy equipment.

3.2.10.2 Hazards

Inhalation and absorption of PCB are the primary routes of entry associated with soil sampling due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. During this project, several different soil sampling methodologies may be used based on equipment accessibility and the types of materials to be sampled. These sampling methods may include the use of hand-auger/sampling probes, sampling spoons, or trowels. The primary hazards associated with these specific sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected may present chemical and physical hazards. The hazards directly associated with soil and air sampling procedures are generally limited to strains or sprains, and potential eye hazards. Exposure to media containing PCB is also possible. In addition to the safety hazards specific to sampling operations, hazards associated with the operation of vehicles (especially large vehicles with limited operator visibility), is a concern. Of particular concern will be the backing up of trucks, excavation equipment, and other support vehicles.

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, ants, fleas, mosquitoes, wasps, spiders, and snakes. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

3.2.10.3 Control

To control dermal exposure during sampling activities, a minimum of Modified Level D protection will be worn. Avoid laying tools and equipment on the ground to avoid contact with native poisonous or irritating flora and fauna. If necessary, based on field observations and site conditions, air monitoring may be conducted during soil sampling activities to assess the potential for exposure to airborne PCB. If the results of air monitoring indicate the presence of organic vapors in a concentration causing concern, personnel will upgrade to Level C protection. Each level of personal protection is described in Section 5, Personal Protective Equipment. Control procedures for environmental and general hazards are discussed in Section 4, General Safety Practices. Collecting subsurface soil samples may involve advancing test pit excavations with excavation equipment. The equipment poses a hazard if it is not properly operated. The presence of overhead utilities and underground obstacles poses a hazard if the excavator contacts them. Safety hazards and procedures associated with activities conducted around excavations are presented in the following subsections.

3.2.11 Turbidity Monitoring

Turbidity monitoring operations involve collecting data from the Kalamazoo River for subsequent laboratory analysis. The physical hazards of turbidity monitoring are primarily associated with the data collection methods, procedures used, and the environment itself. Working on or near water (within 6 feet of the edge) also presents the risk of drowning, if proper procedures are not instituted.

3.2.11.1 Hazards

Drowning is the primary hazard associated with turbidity monitoring due to working on the water. Other hazards directly associated with monitoring procedures are generally limited to strains or sprains and potential eye hazards. Potential chemical hazards may include contact with media containing PCB and potential contact with chemicals used for equipment decontamination. Of particular concern will be boating safety and operation of other support equipment.

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders, and snakes. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

3.2.11.2 Control

To control dermal exposure during turbidity monitoring activities, a minimum of Level D protection, Personal Flotation Devices (PFDs) and sampling gloves will be worn. Each level of personal protection is described in Section 5, Personal Protective Equipment. Control procedures for environmental and general hazards are discussed in Section 4, General Safety Practices. The following sections provide general safety procedures for boat-based sampling, wader use, and working near water. In addition, the items on the Sediment/Surface Water Sampling Checklist (see Attachment E) must be addressed and the checklist must be in the possession of the SS prior to initiating sediment or water-column sampling activities.

3.2.11.3 Water and Boating Hazards

Personnel working over, adjacent to, or near water, where the danger of drowning exists, must wear USCG-approved life jackets or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers must be inspected for defects that would alter their strength and buoyancy. Defective units must be removed from service. Ring buoys with at least 90 feet of line must be provided and readily available for emergency rescue operations. Distance from ring buoys must not exceed 200 feet. At least one boat must be immediately available at locations where employees are working over or adjacent to water.

Boating Hazards and Safety Precautions

Working from a boat presents the obvious hazard of drowning, but several other hazards exist. Powered craft carry a fuel supply, with the potential for fire or explosion if vapors accumulate and reach an ignition source. Weather, currents, and other watercraft may also pose significant hazards to the crew.

In land-based field operations, proper training and equipment are essential to completing a project efficiently and safely. This also holds true for operations conducted on or adjacent to bodies of water. Georgia-Pacific is strongly committed to familiarizing all onsite personnel, who operate boats or conduct work adjacent to bodies of water, with the hazards of water operations and the proper protective measures that must be taken to prevent injury.

The type of boats to be used may include “Jon” boats, electrofishing boats, barges, airboats, and other small powerboats (less than 20 feet). This section outlines the precautions that will be taken to maintain the safety of onsite personnel.

At a minimum, each employee working from a boat is required to participate in a boating safety training session conducted during the daily safety meeting. The training session must provide instruction on the following topics:

- Proper boat and safety equipment inspections;
- Content and frequency of equipment safety inspections;
- Proper use of on-board safety equipment, including fire extinguisher, radio or cellular phone, flares, horn, etc.;
- Proper procedures for completing and filing a float plan;
- Appropriate boating “rules-of-the-road;”
- Emergency procedures in the event of capsizing or being thrown overboard; and
- Different types of PFDs, and their proper inspection and use.

Prior to each day of operations, a boat inspection must be conducted by the boat operator/SS. This inspection must be conducted in accordance with accepted USCG and any applicable state boating safety inspection procedures. The inspection must verify that necessary safety equipment is aboard, functioning properly, and that all crew members are aware of proper procedures that are to be followed on the water. In addition, this

information must be reviewed during the daily tailgate safety meeting to confirm that the procedures have been followed and all crew members are satisfied as to its completion.

It will be the responsibility of the SS to confirm that daily boat and equipment inspections are completed and documented, and daily tailgate safety meetings are conducted. Attachment F provides an example of a Float Plan that can be used for documenting daily boating activities. The following safety procedures must be observed at all times:

- Boat(s) must not be overloaded with equipment or personnel.
- Loads must be distributed evenly throughout the boat.
- PFD Types I, II, or III must be worn at all times when working on or adjacent to the water.
- All PFDs must be properly inspected to confirm that appropriate USCG approvals and ratings information is available.
- At least one Type IV PFD (seat cushion, ring buoy) must be available on board.
- An audible signal or alarm (capable of being heard up to ½ mile away) must be maintained in each boat.
- Each boat must be equipped with a ship-to-shore radio, cellular phone, and/or “walkie-talkie” capable of contacting the USCG, Marine police, or other onshore station to call for help in an emergency.
- Each boat must be equipped with some type of visual display signal or device (e.g., flares or appropriate distress flag).
- All powerboats must have a valid state registration. This registration must be maintained on the boat and, as necessary, be made available for USCG or Marine police inspection.
- At a minimum, each powerboat must be equipped with a Type 4-A, 10-B, C-rated fire extinguisher.
- Boats must not be operated at night without proper lighting and the capability for making visual distress signals.

In addition to PFDs, personnel who are working in boats over water when water temperatures are below 50°F must be equipped with thermal-protective clothing and equipment (wet suits, dry suits, etc.). The thermal-protective clothing must be adequate to protect personnel from hypothermic effects of immersion in water at the temperatures encountered.

Waders

Sampling activities may be done using hip waders and the required level of PPE. Waders must be inspected prior to donning for holes, punctures, tears, or any other defect (i.e., missing straps) that would allow water to enter. Personnel must wear a USCG-approved PFD or buoyant work vest during all activities conducted in water. Prior to each use, the PFD or work vest must be inspected for defects that may alter its strength or buoyancy. Defective units must be tagged “**Do Not Use**” and removed from service. The “buddy system” will be strictly adhered to during any water-related activities. At no time will anyone enter the water without another individual readily available to contact emergency services.

In addition to the drowning hazards associated with working on or near the water, there exists the possibility for slips, trips, or falls caused by slippery, unstable, and irregular walking surfaces. Waders used for sampling activities must be properly sized and provide the wearer with adequate traction.

3.2.12 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin or eye contact with materials that are impacted by site COCs. Based on historical sampling and activities PCB are the COC at the site.

Airborne concentrations of PCB may be measurable during certain activities, and may require air monitoring for potentially hazardous atmospheres during such operations. Air monitoring requirements for site activities are outlined in Section 6, Air Monitoring.

The potential for inhalation of PCB during removal activities is low to moderate. The potential for dermal contact with environmental media containing PCB during removal activities is moderate to high.

Levels of PPE to be used for each work activity were selected based on the COCs at the site at the time this HASP was written, and are discussed in Section 5, Personal Protective Equipment. As analytical data become available, this and each contractor's HASP will be amended to address additional COCs detected, and Material Safety Data Sheets (MSDS) for the specific chemicals will be attached to this and each contractor's HASP.

A MSDS must accompany all materials brought to the site. No material shall be used or installed by any personnel prior to review of the MSDS by the contractor's SS or HSS. Following review of MSDS by the contractor's SS or HSS, copies shall be made and placed in their HASP. The location of MSDS for onsite chemicals shall be communicated to all onsite personnel. All provisions of 29 CFR 1910.1200 are to be followed with regard to chemicals that are to be used during onsite activities.

Table 3-1 lists the chemical, physical, and toxicological properties of PCB. The MSDS for PCB is included in Attachment G.

4. General Safety Practice

4.1 General Safety Rules

Each contractor must keep at least one copy of their HASP in a location at the site that is readily available to onsite personnel, and all project personnel shall review the plan prior to starting work. General safety rules for site activities include, but are not limited to, the following:

- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required, and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and confirm closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by PCB, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by PCB must be reported to the SS or HSS immediately. If necessary, seek medical attention.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by PCB, such as standing water, mud, or discolored soil. Store equipment on elevated or protected surfaces to reduce the potential for incidental contamination.
- Remove PPE as required in the CRZ to limit the spread of PCB-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Do not remove soil potentially containing PCB from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air.
- Inspect all nondisposable PPE for contamination in the CRZ. Decontaminate and dispose of properly any PPE found to be contaminated.
- Recognize emergency signals (e.g., for evacuation, injury, fire).
- Report all injuries, illnesses, near misses, and unsafe conditions or work practices to the SS or HSS.
- Use the “buddy system” during all operations requiring Level C PPE and, when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.

- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer's directions.
- Perform only tasks for which you have been properly trained; advise your supervisor if you have been assigned a task for which you are not trained.
- Do not take prescription or over-the-counter drugs when assigned to tasks with the potential for absorption, inhalation, or ingestion of hazardous substances, unless given written approval by an appropriate health care professional. The presence or consumption of alcoholic beverages or illicit drugs during the work day, including breaks, is strictly prohibited.
- Remain upwind during site activities whenever possible.

4.1.1 Incident Investigation

An incident is any of the following events: first aid cases, injuries, illnesses, near misses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions. All incidents shall be investigated within 24 hours and reported to the PM and the HSO.

- The purpose of an Incident Investigation (II) is to prevent the recurrence of a similar hazardous event. All incidents are investigated in the same manner. The information gathered during an II will be used to create appropriate measures to protect personnel from the hazard in question. An example II Form is included in Attachment H.

4.2 Buddy System

Onsite personnel must use the buddy system required by operations. Use of the buddy system is required during all operations requiring Level C to Level A PPE and, when appropriate, during Level D operations. Crewmembers must observe each other for signs of chemical exposure and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Crew members must also be aware of unsafe acts, non-compliance with safety procedures, and the potential exposure to possible safety hazards.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

4.3 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, and workload, as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature (e.g., a rectal temperature of 41°C [105.8°F]). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area, and the outer clothing should be removed. The worker's skin should be moistened and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated, and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because, once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions

Heat stress monitoring and work/rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work/rest regimen and procedures for calculating ambient adjusted temperature are described in Table 4-1.

**TABLE 4-1
WORK/REST SCHEDULE**

Adjusted Temperature^b	Work/Rest Regimen Normal Work Ensemble^c	Work/Rest Regimen Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° - 90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (30.8° - 32.2°C)	After each 150 minutes of work	After each 120 minutes of work

a. For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)

- b. Calculate the adjusted air temperature ($t_{a\ adj}$) by using this equation: $t_{a\ adj}^{\circ F} = t_a^{\circ F} + (13 \times \% \text{ sunshine})$. Measure air temperature (t_a) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
- c. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
- d. The information presented above was generated using the information provided in the ACGIH Threshold Limit Values (TLV) Handbook.

In order to determine whether the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period; multiply by 2. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measured immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- Onsite drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks, as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek®-type garments.

All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

4.4 Cold Stress

Cold stress normally occurs in temperatures at or below freezing or, under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in Table 4-2.

TABLE 4-2
CHILL TEMPERATURE CHART

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and immersion foot may occur at any point on this chart.											

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].

Local injury resulting from cold is included in the generic term *frostbite*. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by sudden blanching or whitening of skin;
- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient; and
- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

Safety Precautions for Cold Stress Prevention

For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.

At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.

If work is done at normal temperature or in a hot environment before entering the cold, field personnel must confirm that their clothing is not wet as a consequence of sweating. If clothing is wet, field personnel must change into dry clothes prior to entering the cold area.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

Safe Work Practices

Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.

For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters, and workers should be provided with an opportunity to change into dry clothing, if needed.

Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing.

Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

4.5 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, bees, mosquitoes, and other pests, as described in the following sections.

4.5.1 Tick-Borne Diseases

Lyme Disease - This disease commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin. Cases of lyme disease have been reported in most of the continental US to include Michigan.

Erlchiosis - This disease also commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull’s eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, and flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever (RMSF) - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for 2 to 3 weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but, if identified and treated promptly, death is uncommon.

Control - Tick repellant containing diethyltoluamide (DEET) should be used when personnel are working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every 3 or 4 hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

4.5.2 Poisonous Plants

Poisonous plants may be present in the work area. Personnel should be alerted to their presence and instructed on methods to prevent exposure.

Control - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water, and observed for signs of reddening.

4.5.3 Snakes

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control - To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes and the need to avoid actions potentiating encounters, such as turning over logs. If a snakebite occurs, an attempt should be made to safely identify the snake via size and markings. The victim must be transported to the nearest hospital within 30 minutes. First aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

4.5.4 Spiders

The possibility of personnel encountering spiders exists during work activities.

Two spiders are of concern: the black widow and the brown recluse. Both prefer dark, sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately 1 inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widow's body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. It has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful, and the bite site ulcerates and takes many weeks to heal completely.

Control - To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible. First aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

4.6 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents onsite.

Control - All personnel must wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be

exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 6.2, Noise Monitoring.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

4.7 Spill Control

All personnel must take every precaution to minimize the potential for spills during site operations. All onsite personnel shall immediately report any discharge, no matter how small, to the SS.

Spill control equipment and materials will be located onsite at locations that present the potential for discharge. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. In the event of a spill, the SS will follow the provisions in Section 9, Emergency Procedures, to contain and control released materials and to prevent their spread to offsite areas.

4.8 Sanitation

Site sanitation will be maintained according to OSHA requirements, as outlined in the following sections.

4.8.1 Break Area

Breaks must be taken in the SZ, away from the active work area, after site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

4.8.2 Potable Water

The following rules apply to all field operations:

- An adequate supply of potable water will be provided at each project site. Potable water must be kept away from hazardous materials or media, and contaminated clothing or equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed, and must be equipped with a tap dispenser. Water must not be consumed directly from the container (drinking from the tap is prohibited), nor may it be removed from the container by dipping.
- Containers used for drinking water must be clearly marked and shall not be used for any other purpose.
- Disposable drinking cups must be provided. A sanitary container for dispensing cups and a receptacle for disposing of used cups is required.

4.8.3 Sanitary Facilities

Access to facilities for washing before eating, drinking, or smoking, or alternate methods such as waterless hand-cleaner and paper towels, will be provided.

4.8.4 Lavatory

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided. This requirement does not apply to mobile crews or to normally unattended site locations so long as employees at these locations have transportation immediately available to nearby toilet facilities.

4.9 Emergency Equipment

Adequate emergency equipment for the activities being conducted onsite and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 will be onsite prior to the commencement of project activities. Personnel will be provided with access to emergency equipment, including, but not limited to, the following:

- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926;
- Industrial first aid kits of adequate size for the number of personnel onsite; and
- Emergency eyewash and/or shower if required by operations being conducted onsite.

4.10 Lockout/Tagout (LOTO) Procedures

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins, lockout/tagout procedures per OSHA 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy- or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system shall be used. Tagout is the placement of a warning tag on an energy- or material-isolating device indicating that the equipment controls may not be operated until the tag is removed by the personnel who attached the tag.

4.11 Electrical Safety

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.

- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double-insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless they are of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

4.12 Lifting Safety

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.

- Feet must be placed far enough apart for balance. The footing should be solid, and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting: the legs are bent at the knees, and the back is straight as the object is lowered.

4.13 Traffic Safety

Exposure to vehicular traffic is likely during certain operations. Traffic may also be encountered as vehicles enter and exit the area. To minimize the likelihood of project personnel and activities being affected by traffic, the following procedures will be implemented:

- Cones must be placed along the shoulder of the roadway starting 100 feet from the work area to alert passing motorists to the presence of personnel and equipment. A “Slow” or “Men Working” sign must be placed at the first cone. Barricades with flashing lights should be placed between the roadway and the work area.
- During activities along a roadway, equipment will be aligned parallel to the roadway to the extent feasible, facing into the oncoming traffic so as to place a barrier between the work crew and the oncoming traffic. All crewmembers must remain behind the equipment and the traffic barrier.
- All site personnel who are potentially exposed to vehicular traffic must wear an outer layer of orange warning garments, such as vests, jackets, or shirts. If work is performed in hours of dusk or darkness, workers will be outfitted with reflective garments, either orange, white (including silver-coated reflective coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.
- The flow of traffic must be assessed, and precautions taken to warn motorists of the presence of workers and equipment. Where possible, vehicles should be aligned to provide physical protection of people and equipment.

4.14 Elevated Work Safety

During the course of this project, personnel may be exposed to the hazards of working at heights (e.g., ladders, scaffolding). The following sections of 29 CFR 1926 are applicable to the elevated work on this project:

- Subpart L, Scaffolds;
- Subpart M, Fall Protection; and

- Subpart X, Ladders.

All elevated work will be performed in a safe manner and in compliance with all regulations governing such work, and the minimum requirements of this HASP. All personnel exposed to fall hazards shall be trained regarding the nature of the hazards of elevated work prior to assignment.

4.14.1 Fall Protection

All personnel exposed to fall hazards greater than 6 feet shall be protected from the hazard by a fall protection system.

Fall protection systems shall comply with the guidelines established in 29 CFR 1926 Subpart M, Fall Protection.

All personnel exposed to fall hazards shall be trained by a competent person in the following areas:

- The nature of fall hazards in the work area;
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used and the employees' roles and responsibilities associated with the systems;
- The use and operation of the fall protection systems to be used;
- The correct procedures for the handling and storage of materials and equipment and the erection of overhead protection; and
- The fall protection standards contained in 29 CFR 1926 Subpart M, Fall Protection.

Written certification of fall protection training for personnel exposed to fall hazards shall be maintained by each contractor and must be made available to the SS upon request.

4.14.2 Aerial Lifts

Only trained and authorized personnel shall operate aerial lifts.

The operator shall be trained on the same model of aerial lift as the one to be used during actual work site operations. Under the direction of a qualified person, the trainee shall operate the aerial lift for a sufficient period of time to demonstrate proficiency and knowledge. Aerial lifts shall be inspected at least daily prior to operation. The inspection should include, but not be limited to, the following:

- Operating and emergency controls;
- Safety devices;
- Personal protective devices, including fall protection;
- Air, hydraulic, and fuel systems for leaks;

- Cables and wiring harness;
- Loose or missing parts;
- Tires and wheels;
- Placards, warnings, control markings; and operating and safety manual(s);
- Outriggers, stabilizers, extendible axles, and other structures;
- Guardrail system; and
- Other items specified by the manufacturer.

Personnel shall maintain a firm footing on the platform floor. Personnel shall not climb on the guardrails of the aerial platform to gain additional height or reach. Additionally, the use of ladders, planks, buckets, and other makeshift devices to gain additional height or reach is prohibited.

Aerial platforms shall not be driven in an elevated position unless designed to do so.

Only trained personnel shall make repairs to aerial lifts.

Personnel working from boom-type aerial lifts shall be protected from falling by the use of a safety harness and lanyard properly attached to a manufacturer-approved tie-off point.

Before the aerial lift is used, the operator shall check the work area for possible hazards such as, but not limited to, holes, bumps or obstacles, debris, overhead obstructions, inadequate surface and support (soft soils), and wind and weather conditions.

Prior to each lift, the operator shall confirm the following:

- All personnel in the platform are wearing the required fall protection equipment and are secured to manufacturer-approved tie-off locations.
- Outriggers or extendible axles, if so equipped, are used as required by the manufacturer;
- Guardrails are installed and the access gate is closed;
- The load and the distribution of the load are in accordance with manufacturer's recommendations; and
- There is adequate clearance from overhead obstructions.

If an aerial lift is used in the vicinity of overhead power lines, the lines must be de-energized, or the equipment must be positioned such that no part of the aerial platform or personnel on the platform can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

Overhead Hazards

During construction activities, there is a potential for loose material, hand tools, and/or other debris to fall into the area below the personnel platform basket. A demarcated “safety zone” will be established around the perimeter of the work area and maintained during construction activities. Entry into this zone will not be permitted during active work. The safety zone will be large enough to mitigate a potential for injury to onsite personnel in the event of falling debris or tools. In addition, all personnel working on the site will be required to wear an approved hard hat.

4.14.3 Scaffolds

In the event that they are used, scaffolds shall be erected, moved, or dismantled only under the direction and supervision of a competent person who is experienced in scaffold erection, dismantling, or moving. Only trained and experienced personnel selected by the competent person shall perform such work.

Scaffolds shall be inspected prior to use each day and frequently throughout the work shift by a competent person.

Guardrails and toeboards shall be installed on all open sides and ends of scaffold platforms regardless of height.

Footing for scaffolding shall be sound and capable of withstanding the load imposed.

All frame-type scaffolds shall rest on base plates and mudsills.

Blocks, barrels, buckets, boxes, and other unstable items shall not be used to support scaffolds.

Scaffold platforms shall be fully planked, and the planks shall overlap a minimum of 12 inches or be secured to prevent movement.

An access ladder is required for all scaffolds. Climbing of crossbraces is prohibited.

Personnel working on scaffolds shall be trained in the following subject areas at a minimum:

- The nature of fall hazards, electrical hazards, and falling object hazards in the work area;

- The correct procedures for dealing with electrical hazards, and for erecting, dismantling, and maintaining the fall protection and overhead protection systems to be used;
- The proper use of the scaffold and the handling of material and equipment on the scaffold;
- The load capacities of the scaffold; and
- Applicable sections of 29 CFR 1926 Subpart L, Scaffolds.

In addition to the above training, all personnel involved in the erection, moving, and dismantling of scaffolds must be trained by a competent person in the following areas:

- The correct procedures for erecting, dismantling, moving, operating, inspecting, and maintaining the scaffold being used; and
- The design criteria, maximum load carrying capacity, and intended use of the scaffold.

4.14.4 Ladders

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (0.9 meters) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

Ladders shall be maintained free of oil, grease, and other slipping hazards.

Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

Ladders shall be used only for the purpose for which they were designed.

Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).

Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.

Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.

Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.

Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or

holding a ladder that is used upon slippery surfaces, including, but not limited to, flat metal or concrete surfaces that are constructed so that they cannot be prevented from becoming slippery.

Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.

The area around the top and bottom of each ladder shall be kept clear.

The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.

Ladders shall not be moved, shifted, or extended while occupied.

Ladders shall have non-conductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.

Personnel using a stepladder shall not stand or sit on the top, top step, or any step labeled that it or any step above it not be used as a step.

Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.

Ladders shall be inspected by the HSS for visible defects on a daily basis and after any occurrence that could affect their safe use.

Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service.

Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; or corroded components, shall be withdrawn from service.

Ladder repairs shall restore the ladder to a condition meeting its original design criteria before the ladder is returned to use.

Single-rail ladders shall not be used.

When ascending or descending a ladder, the user shall face the ladder.

Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.

An employee shall not carry any object or load onto or off a ladder that could cause the employee to lose balance and fall.

4.15 Heavy Equipment Materials Handling

To protect onsite personnel against hazards associated with material-handling and site restoration activities, and to prevent injury due to unsafe heavy equipment operation, only properly trained and authorized personnel will be allowed to operate heavy equipment. All material-handling equipment will be maintained in a safe operating condition and inspected daily prior to use. Personnel operating forklifts shall be trained and certified in accordance with 29 CFR 1910.178(l). Certification shall be made available to the SS upon request.

Hazards - The physical hazards involved with heavy equipment material-handling activities relate to the work done with heavy equipment and the site environment itself. There exists a potential for incidents involving personnel being struck by or struck against heavy equipment or materials that could result in fractures, cuts, punctures, or abrasions. Heavy equipment operation may present noise hazards, vibration hazards, and a potential for contact with moving parts or hot surfaces to equipment operators. Walking and working surfaces may involve slip, trip, and fall hazards. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. Noise may also present a hazard. Heavy equipment operation frequently results in high noise levels.

4.15.1 Audible Alarms

Every vehicle used to haul dirt, rock, concrete, or other construction material shall be equipped with a warning device that operates automatically while the vehicle is backing. The warning sound shall be of such volume that it will normally be audible from a distance of 200 feet and will sound immediately on backing. In congested areas or areas with high ambient noise that obscures the audible alarm, a signaler, in clear view of the operator, shall direct the backing operation. Other vehicles, if operating in areas where their backward movement would constitute a hazard to employees working in the area on foot, and where the operator's vision is obstructed to the rear of the vehicle, shall be equipped with an effective device or method to safeguard employees, such as:

- An automatic backup audible alarm that would sound immediately on backing, or
- An automatic braking device at the rear of the vehicle that will apply the service brake immediately on contact with any obstruction to the rear, or
- In lieu of the above requirements, administrative controls such as:
 - A spotter or flagger in clear view of the operator who shall direct the backing operation;
 - Other procedures that will require the operator to dismount and circle the vehicle immediately prior to starting a backup operation;
 - All foot traffic prohibited in the work area, or
 - Other means that will furnish safety equivalent to the foregoing for personnel working in the area.

No vehicle operator shall leave the controls of the vehicle while it is moving under its own engine power. Hauling or earth-moving operations shall be controlled in such a manner as to provide that equipment or vehicle operators know of the presence of other personnel in the areas of their operations.

4.15.2 Equipment Inspection and Maintenance

All vehicles in use shall be checked at the beginning of each day to confirm that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brake); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects affecting safe operation shall be corrected before the vehicle is placed into service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, and fire extinguishers, where such equipment is necessary.

Vehicle engines shall not be allowed to run in closed garages or other enclosed places unless vents are provided that effectively remove the exhaust gases from the building.

Except for emergency field repairs, a safety tire rack, cage, or equivalent protection shall be used when inflating truck or equipment tires after mounting on a rim, if such tires depend upon a locking ring or similar device to hold them on the rim.

No repairs shall be attempted on power equipment until arrangements are made to eliminate possibility of injury caused by sudden movements or operation of the equipment or its parts. When the equipment being repaired is a bulldozer, carryall, ripper, or other machine having sharp or heavy moving parts such as blades, beds, or gates, such parts shall be lowered to the ground or securely and positively blocked in an inoperative position.

All controls shall be in a neutral position, with the engine(s) stopped and brakes set, unless work being performed requires otherwise. Trucks with dump bodies shall be equipped with positive means of support, permanently attached and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done. In all cases where the body is raised for any work, the locking device shall be used.

4.15.3 Equipment Parking and Loading

Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set, or be otherwise prevented from moving by effective mechanical means.

Scissor points on all front-end loaders that constitute a hazard to the operator shall be adequately guarded. A loader shall not travel without adequate visibility for the driver and stability of the equipment. No loading device shall be left unattended until the load or bucket is lowered to the ground, unless proper precautions such as blocking are taken to prevent accidental lowering.

4.15.4 Equipment Fueling

No internal combustion engine fuel tank shall be refilled with a flammable liquid while the engine is running. Fueling shall be done in such a manner that the likelihood of spillage is minimal. If a spill occurs, it shall be contained and cleaned, or equivalent action shall be taken to control vapors before restarting the engine. Fuel tank caps shall be replaced before starting the engine.

A good metal-to-metal contact shall be kept between fuel supply tank or nozzle of supply hose and the fuel tank. No open lights, welding, or sparking equipment shall be used near internal combustion equipment being fueled or near storage tanks. No smoking shall be permitted at or near the gasoline storage area or on equipment being fueled. Post a conspicuous sign in each fuel storage and fueling area stating: "NO SMOKING WITHIN 50 FEET." Class I liquids shall not be dispensed by pressure from drums, barrels, or similar containers. Approved pumps taking suction through the top of the container or approved self-closing faucets shall be used. No repairs shall be made to equipment while it is being fueled.

Each fuel storage tank or drum shall have the word *Flammable* conspicuously marked thereon and should also have a similarly sized statement indicating the contents of the container. A fire extinguisher rated 20:BC or larger shall be in a location accessible to the fueling area. All fuel storage tanks, drums, or safety cans shall be properly marked and of the proper type.

4.15.5 Flaggers

Flaggers shall be utilized at locations on a construction site where barricades and warning signs cannot control the moving traffic. When flaggers are required, they shall be placed in relation to the equipment or operation so as to give effective warning and also to be clearly visible to approaching traffic. Placement of warning signs shall be according to the state Department of Transportation (DOT).

Flaggers shall wear orange warning garments such as vests, jackets, or shirts. Rainwear, when worn, shall be orange, but may be another color provided an orange outer warning garment is worn. During the hours of darkness, flaggers' stations shall be illuminated such that the flagger will be clearly visible to approaching traffic, and flaggers shall be outfitted with reflectorized garments. The retro reflective material shall be either orange, white (including silver-coated reflecting coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

Flaggers shall be trained in the proper fundamentals of flagging moving traffic before being assigned as flaggers. Signaling directions used by flaggers shall conform to the DOT standards.

4.15.6 Additional Safety Requirements

To protect onsite personnel against hazards associated with materials handling, and to prevent injury due to unsafe heavy equipment operation, only properly trained and authorized personnel will be allowed to operate heavy equipment. All material-handling equipment will be maintained in a safe operating condition and inspected daily prior to use.

Additional heavy equipment safety requirements include, but are not limited to:

- Prior to operating any heavy equipment, the authorized operator must conduct a pre-operation inspection to confirm that the heavy equipment is in safe operating condition;
- All mobile equipment shall be equipped with an audible back-up alarm;
- Personnel will not be allowed to stand or pass under the elevated portion of any heavy equipment, whether loaded or empty;

- Personnel will not place arms and legs between pinch or scissor points of the equipment or outside the operator enclosure;
- A safe distance shall be maintained from the edge of excavations, ditches, ramps, or platforms;
- Operators will maintain sufficient clearance under objects such as overhead utilities, installations, lights, and pipes;
- Heavy equipment must never be used for lifting or transporting personnel;
- The operator is required to look in the direction of, and maintain a clear view of, the path of travel;
- Heavy equipment shall not be operated without an overhead guard and roll-over device that protect the operator against falling objects and equipment roll-over;
- Heavy equipment must not be driven up to anyone standing in front of any object;
- Stunt driving and horseplay are strictly prohibited;
- Operators will yield the right-of-way to other site vehicles;
- Other heavy equipment traveling in the same direction must not be passed at intersections, blind spots, or other dangerous locations;
- A safe distance must be maintained from other heavy equipment, and the equipment must be kept under control at all times;
- The heavy equipment operator must slow down for wet and slippery conditions. Under all travel conditions, the equipment will be operated at a speed that will permit it to be brought to a stop in a safe manner;
- Operators will avoid running over loose objects on operating surfaces;
- Grades and ramps must be ascended and descended slowly;
- On all grades, the load will be tilted back and raised only as far as necessary to clear the operating surface;
- The operator will slow down and sound the horn at intersections, and when entering locations where vision may be obstructed;
- If the load being carried obstructs forward view, the operator will travel with the load trailing;
- While negotiating turns, speed will be reduced to a safe rate, and turning will be in a smooth, sweeping motion to avoid abrupt turns and potential equipment or load upset;
- Authorized operators will handle only stable or safely arranged loads that are within the rated capacity of the heavy equipment and will not affect the stability of the heavy equipment; and

- When a piece of heavy equipment is left unattended, hydraulics will be fully lowered, controls will be neutralized, power will be shut off, and brakes will be set. Wheels will be blocked or chocked if the heavy equipment is parked on an incline. When heavy equipment powered by an internal combustion engine is utilized indoors, near confined spaces, or near excavations, carbon monoxide levels shall be monitored to prevent personnel exposure.

4.16 Hot Work Safety Program

The purpose of the Hot Work Safety Program is to protect all personnel from hazards associated with activities producing sparks, flames, or other ignition sources, and to prevent the loss of property due to fire. To effectively comply with the provisions of the OSHA standards governing fire prevention and hot work activities, the Hot Work Safety Program establishes procedures to confirm that physical and chemical fire hazards present in the workplace are isolated from hot work activities. The Hot Work Safety Program is applicable to all welding, cutting, burning, grinding, and other spark producing work activities. The contractor's Hot Work Safety Program will meet the following minimum requirements.

4.16.1 Designated Hot Work Areas

Contractors may establish designated hot work areas at the project site. Designated hot work areas must be delineated, and all project site personnel informed of their location.

All project site personnel are responsible for keeping flammable and combustible materials out of designated hot work areas.

4.16.2 Conditions Prohibiting Hot Work

Hot work activities are prohibited in any area of the project site where the following conditions exist:

- In areas potentially containing explosive atmospheres due to the presence of flammable gases, vapors, liquids, or dusts; and
- Within 50 feet of an area where flammable or combustible liquids or gases are used or stored.

Hot work activities shall not be conducted within the areas outlined above. If the requirements of the hot work procedures cannot be met, then the hot work is prohibited and alternative methods shall be employed. All onsite personnel are responsible for preventing hot work activities within prohibited areas. Additionally, no hot work will be conducted on any surface covered with a protective coating whose flammability is not known. Employees conducting hot work activities on toxic preservative coatings shall wear appropriate respiratory protection, and the preservative coatings shall be removed a sufficient distance from the area to be heated.

4.16.3 Hot Work Procedures

Hot work procedures required for welding, cutting, burning, grinding, or spark-producing work conducted at the site are discussed in this subsection. This procedure has been developed to provide basic precautions for fire

prevention and employee safety that must be implemented prior to and during hot work activities outside of designated hot work areas.

- If possible, the object or equipment on which the hot work is to be conducted shall be moved to a designated hot work area.
- If an object or equipment on which hot work is to be conducted cannot be moved, all moveable fire hazards shall be moved at least 50 feet from the hot work operation.
- If an object or equipment on which hot work is to be conducted cannot be moved, or all fire hazards cannot be removed, then guards, barriers, or screens shall be used to confine any heat, sparks, and slag, and to protect the immovable fire hazards.
- All floor, wall, and window openings or cracks within a 35-foot radius shall be protected to prevent exposure of combustible material to heat, sparks, or slag.
- Suitable fire-fighting equipment shall be on hand for immediate use.
- If hot work takes place in an area where flying sparks and slag may injure personnel working near, above, or below the hot work operation, then additional precautions shall be implemented to prevent injury to the personnel (e.g., screens, barriers, caution tape, PPE).
- A fire watch will begin before hot work is initiated and will continue during and for a minimum of 30 minutes after the hot work concludes to confirm that there are no smoldering fires. A fire watch is required whenever hot work is performed outside designated hot work areas.
- Flammable and combustible materials adjacent to the opposite side of metal partitions, walls, ceilings, or roofs that are likely to be ignited by conduction or radiation must be protected by guards, barriers, or screens, or be moved 50 feet away from the metal partitions, walls, ceilings, or roofs.
- If hot work is to be conducted in a confined space, the requirements for the confined space entry must be reviewed and followed.
- Hot work will not be performed in areas where other workers may be affected unless adequate engineering or administrative controls are used to prevent personnel exposure.
- Welding, cutting, and other hot work will not be undertaken unless adequate ventilation, PPE, and well-maintained equipment are used by trained and authorized personnel.
- After welding and cutting has been completed, the area will be thoroughly cleaned, and equipment will be returned to its proper location.
- All personnel involved in hot work activities shall use appropriate PPE.

If any of the basic requirements for fire prevention cannot be implemented prior to or during hot work that is conducted outside a designated hot work area, then the hot work activities will not be conducted.

4.16.4 Fire Watch Procedures

A fire watch is required whenever hot work is performed outside designated hot work areas. Fire watch personnel are required to meet the following requirements:

- Fire watch personnel must have fire-extinguishing equipment readily available for immediate use.
- Fire watch personnel must be trained in the use of the fire-fighting equipment provided.
- Fire watch personnel must be familiar with the procedure to sound the fire alarm in the event of a fire and know the location of the nearest telephone.
- All fire watch personnel shall use appropriate PPE.
- Fire watch personnel must watch for fires and try to extinguish them if it is safe to do so.
- If a fire cannot be extinguished with one fire extinguisher, the area shall be evacuated, the fire alarm system shall be activated, and the appropriate professional fire-fighting organization shall be contacted.
- Fire watch personnel must maintain a fire watch for at least 30 minutes after hot work operations are completed.

If any of the above requirements cannot be met, hot work shall not be conducted.

4.17 Carbon Monoxide

When working indoors or in an excavation with any type of gasoline, diesel or liquefied petroleum (LP) gas powered equipment; carbon monoxide (CO) is a significant hazard. Recognize that a single generator, propane heater or propane fork truck can quickly generate CO above the permissible exposure level regardless of the size of the area. The following guidelines will mitigate any carbon monoxide issues.

- Do not use unvented gas or kerosene space heaters in enclosed spaces.
- When operating any fossil-fueled equipment in enclosed spaces ensure that all pre-operation equipment checks are completed and that the equipment is running to specifications. Smokey exhaust, sputtering, backfires, etc. all indicate an equipment problem requiring immediate service.
- Operate a properly calibrated CO meter (Such as the Multi-Rae) within the worker breathing zone before, during and after equipment operation. Recognize that a CO alarm requires immediate action. Stop work, shut down engines and move to the outdoors until the alarm subsides and it is safe to reenter. Exposure guidelines for CO are listed in Table 6-1.

4.17.1 Symptoms of Carbon Monoxide Exposure

CO is called the silent killer because it has no odor and it slowly overcomes those who are overexposed. Symptoms include: Headache, fatigue, shortness of breath, nausea and dizziness. Employees in the same room

may or may not have all symptoms simultaneously. As with all field work, use the buddy system to keep each other safe.

4.17.2 Treatment of Carbon Monoxide Exposure

If you think you are experiencing any of the symptoms of CO poisoning, get fresh air immediately. Open windows and doors for more ventilation, turn off any combustion equipment, and leave the building. See medical treatment. You could lose consciousness and die if you do nothing. It is also important to contact a doctor immediately for a proper diagnosis. Tell your doctor that you suspect CO poisoning is causing your problems. Prompt medical attention is important if you are experiencing any symptoms of CO poisoning when you are operating fuel-burning devices.

If there are any changes or modifications to the work or site conditions that present additional hazards not covered by the contractor's HASP, the PM and the HSO shall be notified.

4.17.3 Lightning Safety

Lightning is the second greatest cause of storm-related deaths (after floods) in the United States. Although absolute personal protection from lightning cannot reasonably be achieved, the vast majority of lightning casualties can be avoided with awareness, and application of safety guidelines.

Lightning can strike many miles from the parent thunderstorm, well outside the rain area and even beyond the visible thundercloud, and can strike from debris clouds many minutes after the parent thunder storm has decayed.

Lightning Safety Guidelines

Obtain weather forecasts beforehand and schedule activities around the weather to avoid exposure to lightning. Know your local weather patterns.

If you must engage in outdoor activities when lightning exposure is possible, identify and stay within traveling range of a proper shelter. Use the "30-30" rule to decide when to seek shelter. The "30-30" rule states that when you see lightning, count the time until you hear thunder. If this time is 30 seconds or less (you are within six miles of the last flash), go immediately to a safer place, and wait at least 30 minutes following dissipation of the storm (last audible thunder) before leaving the shelter.

When lightning threatens, do not hesitate to go to a safer location. Even a few extra minutes lead time can be life saving (don't be the guy that "almost made it"). The safest location for lightning protection is a large, fully enclosed, substantially constructed building. Do not touch any conductor exposed to the outside – stay away from corded telephones, electrical appliances, lighting fixtures, electrical sockets and plumbing. Inner rooms are safest, and avoid watching lightning from an open window or doorway. If you can't reach a substantial building, an enclosed vehicle with a solid metal roof and metal sides is a reasonable second choice. Again, keep windows closed and avoid contact with conducting paths going outside (steering wheel, door handles, radio, etc).

If you cannot reach a safer location, take action to minimize the threat of being struck. Move from higher to lower elevation. Avoid wide-open areas (fields, beaches, etc). Avoid water-related activities. Avoid tall

isolated objects like trees. Do not remain in open vehicles like tractors or cabless construction machinery. Avoid unprotected open structures, metal fences and other long metal structures.

If you are caught far from a safer place and lightning is about to strike, it will sometimes provide a very few seconds of warning. Sometimes your hair may stand on end, you skin will tingle, light metal objects will vibrate, or you will hear a crackling sound. If this happens, use the “lightning crouch” – put your feet together, squat down, tuck your head and cover your ears. If you are in a group, spread out to provide several body lengths between individuals before crouching. When the immediate threat has passed, proceed to the safest place possible.

No lightning safety guidelines will provide 100% guaranteed safety; however, these will greatly minimize the lightning hazard.

The Lightning Safety Plan

When conducting activities where lightning exposure is possible a site specific Lightning Safety Action Plan must be prepared.

A designated responsible individual (or individuals) to monitor the weather and to initiate the evacuation process when appropriate.

Safer sites must be identified beforehand, along with a means to route the people to those locations.

A “Warning” signal, and “All Clear” signal.

5. Personal Protective Equipment

5.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required, depending on the levels of PCB and the degree of physical hazard. However, exposure to unacceptable PCB levels is not anticipated. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in Table 5-1 in this section.

5.1.1 Level D Protection

The minimum level of protection that will be required of onsite personnel will be Level D, which will be worn when conditions or air monitoring indicates that no inhalation hazard exists. The following equipment will be used:

- Work clothing, as prescribed by weather;
- Steel-toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Hard hat, meeting ANSI Z89, when falling object hazards are present; and
- Hearing protection. If noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used.

5.1.2 Modified Level D Protection

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of Level D plus any of the following:

- Nitril Solve, Butyl or viton (Best Glove Catalog or equivalent) gloves;
- Latex/polyvinyl chloride (PVC) overboots when contact with PCB-impacted media is anticipated;
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist;
- Hard hat, meeting ANSI Z89 when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used);
- PFD if working in a boat or over the water where potential for drowning exists; and
- Tyvek[®] suit (polyethylene coated Tyvek[®] suits for handling liquids) when body contact with PCB-impacted media is anticipated.

5.1.3 Level C Protection

Level C protection will be required when the airborne concentration of PCB reaches one-half of the OSHA Permissible Exposure Limit (PEL) of 1 milligram per cubic meter (mg/m^3) (a time-weighted concentration) or the ACGIH TLV. The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with high-efficiency particulate air (HEPA) cartridges;
- Polyethylene-coated Tyvek[®] suit, with ankles and cuffs taped to boots and gloves;
- Nitrile, butyl or viton gloves (Best Glove Catalog);
- Steel-toe work boots, meeting ANSI Z41;
- Chemical resistant boots with steel toes, or latex/PVC overboots over steel-toe boots;
- Hard hat, meeting ANSI Z89; and
- Hearing protection. If noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used.

5.2 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising contractor personnel and contractor health and safety professionals. The PPE used will be chosen to be effective against the COCs present on the site (i.e., PCB).

5.3 Site Respiratory Protection Program

Respiratory protection is an integral part of employee health and safety at the site due to potentially hazardous concentrations of airborne PCB. The contractor's site respiratory protection program will meet the following minimum requirements:

- All onsite personnel who may use respiratory protection will have an assigned respirator.
- All onsite personnel who may use respiratory protection will have been fit-tested and trained in the use of the respirator to be used within the past 12 months.
- All onsite personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the HSS, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.

- Contact lenses are not to be worn when a respirator is worn.
- All onsite personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test will be performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

5.4 Using PPE

Depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Modified Level D or Level C PPE is used. All personnel entering the EZ must put on the required PPE in accordance with the requirements of their HASP (which will meet the minimum requirements of this HASP). When leaving the EZ, PPE will be removed to minimize the spread of PCB.

5.4.1 Donning Procedures

These procedures are mandatory only if Modified Level D or Level C PPE is used on the site:

- Remove bulky outerwear. Remove street clothes and store in clean location.
- Put on work clothes or coveralls.
- Put on the required chemical protective coveralls.
- Put on the required chemical protective boots or boot covers.
- Tape the legs of the coveralls to the boots with duct tape.
- Put on the required chemical protective gloves.
- Tape the wrists of the protective coveralls to the gloves.
- Don the required respirator and perform appropriate fit check (Level C).
- Put hood or head covering over head and respirator straps and tape hood to facepiece (Level C).
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to confirm that each person entering has the proper protective equipment.

5.4.2 Doffing Procedures

The following procedures are mandatory only if Modified Level D or Level C PPE is required for the site. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers.
- Clean reusable protective equipment.
- Remove protective garments, equipment, and respirator (Level C). All disposable clothing must be placed in plastic bags that are labeled with “contaminated waste” labels.
- Wash hands, face, and neck (or shower, if necessary).
- Proceed to clean area and dress in clean clothing.
- Clean and disinfect respirator (Level C) for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags and labeled for disposal. See Section 7.2, Decontamination, for detailed information on decontamination stations.

5.5 Selection Matrix

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the contractor SS and HSS of the potential for skin contact with PCB. The PPE selection matrix is presented in Table 5-1. This matrix is based on information available at the time this plan was written. The Airborne Contaminant Action Levels in Table 6-1 should be used to verify that the PPE prescribed in these matrices is appropriate.

Table 5-1
PPE Selection Matrix

Task	Level of Protection
Mobilization	Level D
Clearing and Grubbing	Level D/Modified Level D
Excavation	Modified Level D/Level C
Waste Handling and Loading	Modified Level D
Field Sampling	Level D/Modified D
Site Restoration	Level D
Decontamination	Modified Level D
Demobilization	Level D

6. Air Monitoring

6.1 Air Monitoring

Air monitoring will be conducted by each contractor or subcontractor, as necessary, to determine onsite personnel exposure to airborne constituents. The monitoring results will dictate work procedures and the selection of PPE. The anticipated monitoring devices to be used are a Rae Systems MultiRAE detector (photoionization detector [PID] with a 10.6 eV lamp/oxygen/Lower Explosive Limit [LEL]/Hydrogen Sulfide Sensors), a MIE PDR1200 particulate monitor, and an Andersen Instruments GPS-11 air sampler (or equivalents). The contractor's HSS will be responsible for utilizing the air monitoring results to determine appropriate health and safety precautions. Air monitoring results should be recorded in field notebooks or on an air monitoring log (see Attachment I for an example air monitoring log).

Air monitoring should be performed continuously with the MultiRAE during activities where flammable vapors could be generated. All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the LEL at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level. In areas where petroleum hydrocarbons are suspected, benzene detector tube readings must be taken if PID readings exceed 1 parts per million (ppm), and are sustained for 15 minutes in the breathing zone.

Air monitoring should be conducted with the PDR1200 (or equivalent) during all activities that have the potential to generate airborne particulates.

6.2 Noise Monitoring

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

6.3 Monitoring Equipment Maintenance and Calibration

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions that the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed health and safety forms must be reviewed by the contractor's HSS and maintained by the contractor's SS.

All air-monitoring equipment will be maintained and calibrated in accordance with the specific manufacturer's procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the contractor's HSS must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate

replacement unit is obtained. The contractor's HSS will be responsible for confirming that a replacement unit is obtained and/or repairs are initiated on the defective equipment.

6.4 Action Levels

Table 6-1 presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

Table 6-1
Airborne Contaminant Action Levels

Parameter	Reading	Action
Total Hydrocarbons	0 ppm to 5 ppm ≥ 5 ppm	Normal operations; continue hourly breathing zone monitoring Stop work; investigate cause of reading. Contact HSO
Airborne Particulates	< 150 $\mu\text{g}/\text{m}^3$ ≥ 150 $\mu\text{g}/\text{m}^3$	Normal operations; continue periodic breathing zone monitoring Initiate dust suppression measures; if suppression measures are insufficient to reduce particulates below 150 $\mu\text{g}/\text{m}^3$, upgrade to Level C and increase monitoring frequency to every 15 minutes
Flammable Vapors (LEL)	< 10% LEL ≥ 10% LEL	Normal operations, acceptable entry condition Stop work, ventilate area, investigate source of vapors
Hydrogen Sulfide	< 5 ppm ≥ 5 ppm	Normal operations, acceptable entry condition Stop work; evacuate confined space; ventilate area; investigate source of vapors
Carbon Monoxide	< 25 ppm ≥ 25 ppm	Normal operations, acceptable entry condition Stop work; evacuate confined space; ventilate area; investigate source of vapors
Oxygen	> 19.5%, < 23.5% < 19.5%, > 23.5%	Normal operations, acceptable entry condition Stop work; evacuate confined space; ventilate; re-sample
PCB	< 0.02% $\mu\text{g}/\text{m}^3$ or 0.2 $\mu\text{g}/\text{m}^3$ (depending on location) ≥ 0.02 $\mu\text{g}/\text{m}^3$ or 0.2 $\mu\text{g}/\text{m}^3$ (depending on location)	Normal operations, continue monitoring. Stop work, notify USEPA and implement corrective actions to reduce emissions.

6.5 Community Air Monitoring

Dust monitoring will be conducted periodically (at least every 2 hours) along downwind perimeters to evaluate the amount of dust that may be migrating off site. Dust suppression techniques will be implemented if levels at the perimeter reach 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or greater. PCB will be monitored in ambient air in two locations to assess emissions, with an action level of 0.02 $\mu\text{g}/\text{m}^3$. However, in accordance with Rule 225 (3) of Part 55, Act 451 as amended, a 10-fold increase in the secondary risk screening levels is permitted if the ambient impact occurs on industry property or public roadways. Given the nature of the physical settings of the

removal activities, an action level of $0.2 \mu\text{g}/\text{m}^3$ for the third location will be used, which will be positioned near the work area. If an action level is exceeded, the USEPA will be notified and corrective actions will be taken to reduce emissions. It should be noted, as conditions change or removal activities move to new locations the air samplers may move to new location, as well. Any new air sampler location will be selected after consultation with USEPA OSC.

7. Work Zones and Decontamination

7.1 Work Zones

7.1.1 Authorization to Enter

Only personnel with the appropriate training and medical certifications (if respirators are required) will be allowed to work at the project site. The SS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the site work areas.

7.1.2 Site Orientation and Hazard Briefing

No person will be allowed in the work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the contractor's SS or HSS and will consist of a review of the contractor's HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Following this initial meeting, daily safety meetings will be held each day before work begins.

All people entering the site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings, on the forms included with this plan (or on the contractor's forms if equivalent).

7.1.3 Certification Documents

A training and medical file may be established for the project and kept onsite during all site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all appropriate field personnel required to wear respirators, will be maintained within that file. All personnel must provide their training and medical documentation to the HSS prior to starting work.

7.1.4 Entry Log

A log-in/log-out sheet will be maintained at each work area by the contractor's SS. Personnel must sign in and out on this log sheet as they enter and leave a work area, and the SS may document entry and exit in the field notebook.

7.1.5 Entry Requirements

In addition to complying with the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any work area unless they are wearing the minimum PPE as described in Section 5, Personal Protective Equipment.

7.1.6 Emergency Entry and Exit

All personnel who must enter the work area on an emergency basis will be briefed of the hazards by the contractor's SS. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a safe area for a head count. The SS is responsible for confirming that all people who entered the work area have exited in the event of an emergency.

7.1.7 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

7.1.7.1 Exclusion Zone

The EZ is the defined area where there is a possible respiratory and/or contact health hazard. An EZ may consist of a specific work area or may be the entire area of potential contamination. All employees entering an EZ must use the required PPE and must have the appropriate training and medical clearance for hazardous waste work. Cones, caution tape, or a site diagram will identify the location of each EZ.

7.1.7.2 Contamination Reduction Zone

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through the CRZ to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed onsite adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.

7.1.7.3 Support Zone

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to site requirements.

7.1.8 Posting

Work areas will be prominently marked and delineated using cones, caution tape, or a site diagram.

7.1.9 Site Inspections

Each contractor's SS will conduct a daily inspection of site activities, equipment, and procedures to verify that the required elements are in place. The Health and Safety Inspection Form in Attachment J may be used as a guide for daily inspections.

7.2 Decontamination

7.2.1 Personnel Decontamination

All personnel wearing Modified Level D or Level C protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- *Station 1:* Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.
- *Station 2:* Personnel will remove their outer garment and gloves and dispose of them in properly labeled containers. Personnel will then decontaminate their hard hats and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand-carried to the next station.
- *Station 3:* Personnel will thoroughly wash their hands and face before leaving the CRZ. If necessary, respirators will be sanitized and then placed in a clean plastic bag.

7.2.2 Equipment Decontamination

All vehicles that have entered the EZ will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to the rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required. If the vehicle does not come in contact with impacted material no cleaning will be required.

7.2.3 Personal Protective Equipment Decontamination

For onsite personnel who come in direct contact with PCB-impacted material where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing when worn must be disposed of in properly labeled containers. Reusable protective clothing, when worn, will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

If a respirator is necessary, when removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves, and covers must be thoroughly cleaned at the end of each work shift, and be ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water, or by using a spray disinfectant.

8. Training and Medical Surveillance

8.1 Training

8.1.1 General

All onsite personnel who work in areas where they may be exposed to site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Each contractor's SS must have completed an additional eight hours of supervisory training, and must have a current first aid/CPR certificate.

8.1.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour HAZWOPER training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment onsite;
- Medical surveillance requirements;
- Recognition of symptoms and signs that might indicate overexposure to hazards;
- Worker right-to-know information (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;

- Confined-space entry procedures; and
- General emergency response procedures.

8.1.3 Supervisor Course

Supervisors must receive an additional 8 hours of training that typically includes:

- General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

8.1.4 Site-Specific Training

Site-specific training will be performed by each contractor. Possible methods of training include having onsite personnel read their contractor's HASP, or conducting a thorough site briefing by the PM, SS, or HSS on the contents of the HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures.

8.1.5 Daily Safety Meetings

Daily safety meetings will be held to cover the work to be accomplished, the hazards anticipated, the PPE and procedures required to minimize site hazards, and emergency procedures. Each contractor's SS or HSS should present these meetings prior to beginning the day's fieldwork. No work will be performed in an EZ before the daily safety meeting has been held. The daily safety meeting must also be held prior to new tasks and repeated if new hazards are encountered. The meeting should be documented; an example Daily Safety Meeting Log is included in Attachment K.

8.1.6 First Aid and CPR

At least one employee currently certified in first aid/CPR will be assigned to each contractor's work crew and will be onsite during operations. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

8.2 Medical Surveillance

8.2.1 Medical Examination

All personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1910.120 (f).

8.2.2 Pre-placement Medical Examination

All potentially exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable regulations. The pre-placement and periodic medical examinations typically include the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations and confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work.

Contractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Contractors will supply copies of the medical examination certificate for each onsite employee.

8.2.3 Other Medical Examinations

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the contractor's HSS, HSO, or occupational physician in anticipation of, or after, known or suspected exposure to toxic or hazardous materials.

8.2.4 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be determined by the contractor but generally not less than every two years.

8.2.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the HSS. The terms of the restriction will be discussed with the employee and the supervisor.

9. Emergency Procedures

9.1 General

Prior to the start of operations, the work area will be evaluated for the potential for fire, contaminant release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the contractor's SS/HSS immediately.

The contractor's SS/HSS will establish evacuation routes and assembly areas for the site. All personnel entering the site will be informed of this route and the assembly area.

9.2 Emergency Response

If an incident occurs, the following steps will be taken:

- The contractor's SS/HSS will immediately contact Georgia-Pacific's PM.
- The contractor's SS/HSS will evaluate the incident and assess the need for assistance and/or evacuation.
- The contractor's SS/HSS will call for outside assistance, as needed.
- The contractor's SS/HSS will ensure the PM is notified promptly of the incident.
- The contractor's SS/HSS will take appropriate measures to stabilize the incident scene.

9.2.1 Fire

In the case of a fire at the site, the contractor's SS/HSS will assess the situation and direct fire-fighting activities. The contractor's SS/HSS will ensure that the PM is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish with one fire extinguisher, the local fire department will be summoned.

9.2.2 Contaminant Release

In the event of a contaminant release, the following steps will be taken:

- Notify contractor's SS/HSS immediately;
- Evacuate immediate area of release;
- Conduct air monitoring to determine necessary level of PPE; and
- Don required level of PPE and prepare to implement control procedures.

9.3 Medical Emergency

All employee injuries must be promptly reported to the contractor's HSS/SS, who will:

- Confirm that the injured employee receives prompt first aid and medical attention; and
- In emergency situations, confirm that the worker is transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room).

9.3.1 Emergency Care Steps

- Survey the scene. Determine whether it is safe to proceed. Try to determine whether the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.
- Do a primary survey of the victim. Check for airway obstruction, breathing, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victim's condition, and help being given.
- Maintain airway and perform rescue breathing, as necessary.
- Perform CPR, as necessary.
- Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.
- Treat other conditions as necessary. If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

9.4 First Aid - General

All persons must report any injury or illness to their immediate supervisor or the contractor's SS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The contractor's SS and HSS must conduct an investigation as soon as emergency conditions no longer exist and first aid and/or medical treatment has been provided. Incident investigations must be completed and submitted to Georgia-Pacific within 24 hours after the incident.

If first aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured person(s) should be transported to the designated medical facility. If the injured person is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

9.4.1 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures, will be removed from the work area and transported to the designated medical facility for examination and treatment.

9.4.2 First Aid - Ingestion

Call EMS and consult a poison control center for advice. Refer to the MSDS (if available) for treatment information. If the victim is unconscious, keep him/her on his/her side and clear the airway if vomiting occurs.

9.4.3 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing and then flush the affected area with water for at least 15 minutes. The worker should be transported to the designated medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

9.4.4 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean, running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

9.5 Reporting Injuries, Illnesses, and Near Miss Incidents

Injuries and illnesses, however minor, will be reported to the contractor's SS immediately. The contractor's SS will complete an injury report and submit it to Georgia-Pacific within 24 hours.

Near-miss incidents are situations during which no injury or property damage occurred, but during which, under slightly different circumstances, an injury or property damage could have occurred. Near misses are caused by the same factors as injuries; therefore, they must be reported and investigated in the same manner. Work shall be stopped and a hazard assessment conducted immediately after an injury, illness, near miss, or other incident to determine whether it is safe to proceed with the work.

9.6 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in Table 9-1.

**TABLE 9-1
EMERGENCY CONTACTS**

Agency	Telephone No.
Fire	911
Police	911
Ambulance	911
Hospital:	(269) 341-7654
Project Manager:	TBD
Site Supervisor:	TBD
Client Contact:	TBD

9.6.1 Directions to Hospital

Bronson Methodist Hospital
601 John Street
Kalamazoo, MI 49007

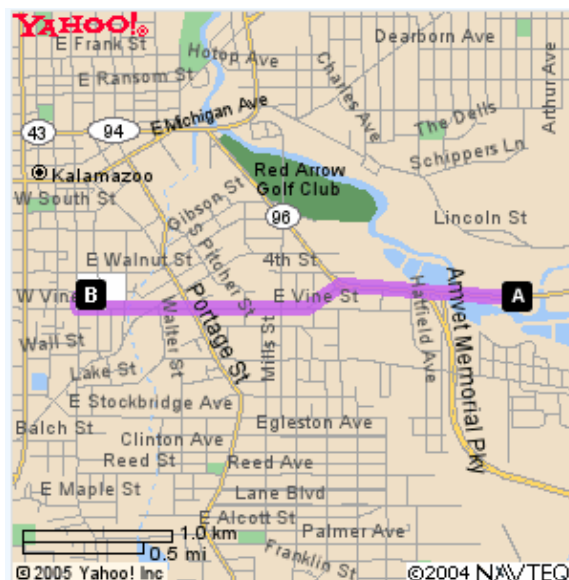
See below map for directions to the hospital.

It is the responsibility of the HSS to verify the directions to the hospital prior to the start of work.

Directions to Bronson Methodist Hospital:

1. Start at King Highway, Kalamazoo on M-96 – go 0.7 mile.
2. Bear left on Branch Street – go 0.2 mile.
3. Bear right on East Vine Street – go 0.9 mile.
4. Turn right on South Burdick Street – go < 0.1 mile.
5. Continue on John Street – go 0.1 mile.
6. Arrive at 601 John Street, Kalamazoo.

**Figure 2
Map and Directions to Bronson Methodist Hospital**



10. References

Blasland, Bouck & Lee, Inc. (BBL). 2003. Georgia-Pacific Corporation Kalamazoo Paper Mill Property Divestiture Study – Supporting Materials (Syracuse, NY: March 4, 2003).

BBL. 2005. Georgia-Pacific Corporation Former Hawthorne Mill Investigation-Related Documents (Syracuse, NY: November 2005).

Table

**TABLE 3-1
CHEMICAL HAZARD INFORMATION**

Substance [CAS Number]	IP ¹ (eV)	Odor Threshold (ppm)	Route ²	Symptoms of Exposure	Treatment	TWA ³	STEL ⁴	Source ⁵	IDLH (NIOSH) ⁶
Polychlorinated biphenyls (PCB)	ND	ND	Inh Abs Ing Con	Aroclor 1242: irritated eyes; chloracne; acne-form dermatitis; mildly toxic by ingestion; poison by subcutaneous route – probable carcinogen Aroclor 1254: irritated eyes and skin; acne-form dermatitis; poison by intravenous route; moderately toxic by ingestion and intraperitoneal routes – probable carcinogen	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	Aroclor 1242: 1 mg/m ³ (skin) 1 mg/m ³ (skin) 0.001 mg/m ³ Aroclor 1254: 0.5 mg/m ³ (skin) 0.5 mg/m ³ (skin) 0.001 mg/m ³		PEL TLV REL PEL TLV REL	Ca (10 mg/m ³) Ca (5 mg/m ³)

¹IP = Ionization potential (electron volts).

²Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; and Con, Skin and/or eye contact.

³TWA = Time-weighted average. The TWA concentration for a normal workday (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

⁴STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.

⁵PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).

⁵TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value – TWA.

⁵REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.

⁶IDLH (NIOSH) = Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

Ca = Carcinogen.

ND = Not Determined

References:

American Conference of Governmental Industrial Hygienists Guide to Occupational Exposure Values, 2003, compiled by the American Conference of Governmental Industrial Hygienists.

American Conference of Governmental Industrial Hygienists Threshold Limit Values, 2003, compiled by the American Conference of Governmental Industrial Hygienists

Amoore, J. and E. Hautula, "Odor as an Aid to Chemical Safety," Journal of Applied Toxicology, 1983.

Clayton, George D. and F.E. Clayton, Patty's Industrial Hygiene and Toxicology, 3rd ed., John Wiley & Sons, New York.

Documentation of TLVs and BEIs, American Conference of Governmental Industrial Hygienists, 5th ed., 1986.

Fazzuluri, F.A., Compilation of Odor and Taste Threshold Values Data, American Society for Testing and Materials, 1978.

Gemet, L. and J. Van, Compilation of Odor Threshold Values in Air and Water, CIVO, Netherlands, 1977.

Gemet, L. and J. Van, Compilation of Odor Threshold Values in Air and Water, Supplement IV, CIVO, Netherlands, 1977.

Lewis, Richard J., Sr., 1992, Sax's Dangerous Properties of Industrial Materials, 8th ed., Van Nostrand Reinhold, New York.

Micromedex Tomes Plus (R) System, 1992, Micromedex, Inc.

National Institute for Occupational Safety and health Pocket Guide to Chemicals, Pub. 1990, No. 97-140, National Institute for Occupational Safety and Health, 2003.

Odor Threshold for Chemicals with Established Occupational Health Standards, American industrial Hygiene Association, 1989.

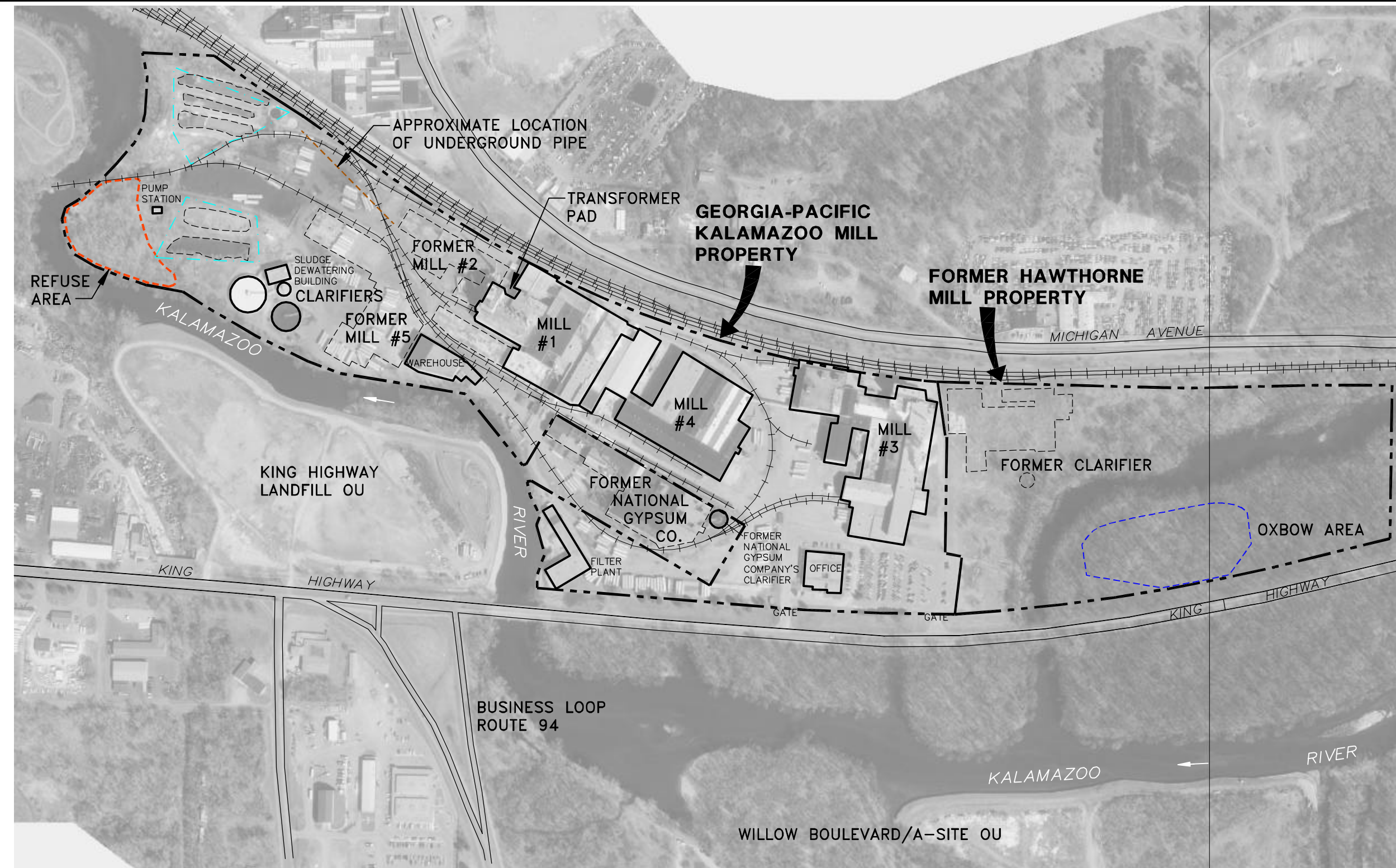
Respirator Selection Guide, 3M Occupational Health and Safety Division, 1993.

Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand and Reinhold, 1977.

Warning Properties of Industrial Chemicals – Occupational Health Resource Center, Oregon Lung Association.

Workplace Environmental Exposure Levels, American Industrial Hygiene Association, 1992.

Figure

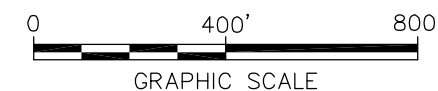


LEGEND:

- APPROXIMATE REFUSE AREA REMOVAL AREA
- APPROXIMATE OXBOW AREA REMOVAL AREA
- APPROXIMATE MILL LAGOON PROPERTY BOUNDARY
- APPROXIMATE BOUNDARY OF KALAMAZOO MILL AND HAWTHORNE MILL PROPERTIES
- APPROXIMATE BOUNDARY OF FORMER MILLS
- OUTLINE OF STANDING STRUCTURES

NOTES:

1. PLANIMETRIC MAPPING, INCLUDING PROPERTY BOUNDARIES, IS APPROXIMATE.
2. AERIAL IMAGE DERIVED FROM ORTHOPHOTOGRAPHIC DATA BY AIR LAND SURVEYS, INC., FLOWN 4/24/99.
3. FORMER MILL LAGOONS EXCAVATED PER KING HIGHWAY LANDFILL-OPERABLE UNIT AOC, 1999-2000.



DRAFT

GEORGIA-PACIFIC CORPORATION
KALAMAZOO MILL PROPERTY
TIME CRITICAL REMOVAL ACTION
HEALTH AND SAFETY PLAN

**GEORGIA-PACIFIC KALAMAZOO MILL
AND HAWTHORNE MILL
SITE PLAN**



FIGURE
1

Attachments

Attachment A

HASP Acknowledgement Form

	Health and Safety Plan Acknowledgment
--	--

I have read the Site-Specific Health and Safety Plan, or its contents have been presented to me, and I understand the contents and I agree to abide by its requirements.

[illegible]

Attachment B

Equipment Inspection Form

EQUIPMENT PRE-OPERATION INSPECTION			
Date: _____	Hours Start: _____		
Unit: _____	Hours End: _____		
Operator: _____	Shift: _____		
CHECK BEFORE OPERATING	OK	NR	COMMENTS
Seat Belts			
Back-up Alarm			
Brakes (service/retarder, secondary, park)			
Low Air Pressure			
Steering Components			
Speedometer			
Tires (flats/lug nuts loose)			
Pins (hoist cylinders/body wiretainers)			
Auto Lube System (is truck lubricated?)			
Fluid Leaks			
Fluid Levels			
Lights (head, tail, brake, retarder, clearance, hazard, panel)			
Fire Extinguisher (portable)			
Glass/Mirrors			
Horn			
Wheel Chocks			
Windshield Wipers			
Heater/Air conditioner (circle)			
Grab Irons/Steps/Ladders (circle)			
Frame Cracks/Bed Cracks/Nose Cone Assembly (circle)			
Clean Working Place			
Drain Air Tanks (main, secondary, governor)			
Operator's Seat/Passenger's Seat (circle)			
Suspensions			
Doors			
Safety Chains & Cables			
Exhaust System			
Air Cleaners			
Hoist Cylinders (hard to dumo)			
Canopy & Rock Guards			
Radio			
Automatic Electronic Traction Aid System			
Ducktail on Bed Intact?			
Does Automatic Retarder Work Correctly			
Gauges and All Other Warning Devices			
Starter			
Switches			
NR = Needs Repaired			

Attachment C

Underground/Overhead Utility Checklist

		Underground / Overhead Utility Checklist	
Project Name:		Date:	
Project Number:		Location:	
Prepared By:		Project Manager:	
<p>This checklist must be completed for any intrusive subsurface work such as excavation or drilling. It documents that overhead and underground utilities in the work area are identified and located. The Project Manager shall request utility markouts before the start of field operations to allow the client and utility companies sufficient time to provide them. If complete information is not available, a magnetometer or other survey shall be performed to locate obstacles prior to intrusive subsurface activities.</p>			
<p>Procedure: A diagram of the work area depicting the proposed location of intrusive subsurface work sites (i.e., boring locations, excavation locations) must be attached to this form. The diagram must clearly indicate the areas checked for underground structures / utilities, and overhead power lines. This form and the diagram must be signed by the BBL Project Manager (if present), the BBL Site Supervisor, and the client representative.</p>			
Type of Structure	Present	Not Present	Method of Markout
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
Product Line			
Sewer Line			
Steam Line			
Drain Line			
Underground Tank			
Underground Cable			
Overhead Power Line			
Overhead Product Line			
Other (Specify)			
Reviewed By			
Name		Job Title	Date
		Client Representative	
		BBL Project Manager	
		BBL Site Supervisor	

Attachment D

Periodic Excavation Inspection Form

		Daily / Periodic Excavation Inspection Checklist	
Project Name:		Date / Time:	
Project Number:		Location:	
Prepared By:		Project Manager:	
This checklist must be completed for all excavations. It documents that daily and post-event / periodic inspections are conducted.			
Soil Classified As:	Stable Rock	Type A	Type B Type C
Soil Classified On:		By:	
Type of Protective System in Use:		Sloping	Shoring Other _____
Description:			
Inspection Item	YES	NO	Comments
Is the underground / overhead utilities checklist completed?			
Are underground installations protected from damage?			
Are adequate means of entry / exit available in the excavation?			
If exposed to traffic, are personnel wearing reflective vests?			
Do barriers exist to prevent equipment from rolling into the excavation?			
Was air monitoring conducted prior to and during excavation entry?			
Was the stability of adjacent structures reviewed by a registered P.E.?			
Are spoil piles at least 2 feet from the excavation edge?			
Is fall protection in use near excavations deeper than 6 feet?			
Are work tasks completed remotely if feasible?			
Is a protective system in place and in good repair?			
Is emergency rescue (lifeline / body harness) equipment used due to potential atmospheric hazard?			
Is excavation exposed to vibration?			
Are employees protected from falling / elevated material?			
Is soil classification adequate for current environmental / weather conditions?			
Do portable ladders extend at least 4 feet above the excavation?			
Are portable ladders or ramps secured in place?			
Have all personnel attended safety meeting on excavation hazards?			
Are support systems for adjacent structures in place?			
Is the excavation free from standing water?			
Is water control and diversion of surface runoff adequate?			
Are employees wearing required protective equipment?			
BBL Excavation Competent Person:			Date/Time:

Attachment E

Sediment/Surface Water Sampling Checklist

SEDIMENT/SURFACE WATER SAMPLING CHECKLIST

Project Name/Number _____ **Date** _____

Location _____

Prepared By _____ **Project Manager** _____

This checklist must be completed for any sediment or surface water sampling. It documents that the required, permits, notifications, procedures and equipment are in place prior to commencing sampling activities. The Project Manager shall identify the need for and arrange to obtain sampling permits, clearance or right-of-way access from the appropriate entity during project planning.

Procedure

Prior to any work on a navigable waterway or any activity that requires access the following items will be completed:

Activity:	Required for project:		Completed:		Comments:
Access rights to property	YES	NO	YES	NO	
Activity planned that impedes traffic on navigable waterway	YES	NO	YES	NO	
Notification and approval obtained from United States Coast Guard and/or other regulating authority (County, US Parks Service, EPA)	YES	NO	YES	NO	
Buoys, signs markings or other forms of notification present	YES	NO	YES	NO	
Other (Specify)					

Boating/Water Safety Checklist:

Activity:	Required for project:		Requirement:	Comments:
Working on over or near water (within 6 feet)	YES	NO	PFD Available for all personnel	
Boat has current registration, has been inspected and loaded safely	YES	NO	Capacity, load distribution PFDs and throwable floatation device available Fire extinguisher on board	
Boat operator has appropriate training (USCG Boating Safety Course or equivalent)	YES	NO		
Sampling on or near water below 50 degrees Fahrenheit	YES	NO	Cold water immersion suit for affected personnel	
Method of communication available	YES	NO	Radio, cell phone or scheduled check-in	

Client Representative _____ Date _____

Project Manager _____ Date _____

Site Supervisor _____ Date _____

6/20/2006

C:\Documents and Settings\KCALLAHAN\Desktop\GP Mill WP documents\HASP\HASP attachments\Attachment E
14261750_HASP_Sediment Sampling Checklist.doc

Attachment F

Float Plan

Float Plan

Complete this page, before going boating and leave it with a reliable person who can be depended upon to notify the Coast Guard or other rescue organization, should you not return as scheduled.

Do not file this plan with the Coast Guard.

1. Name of person reporting and telephone number: _____

2. Description of boat:

Type _____ Color _____ Trim _____

Registration No. _____ Length _____

Name _____ Make _____ Other Info. _____

3. Engine type: _____ H.P. _____

No. of engines _____ Fuel Capacity _____

4. Survival equipment (check as appropriate):

☐ PFDs

☐ Flares

☐ Mirror

☐ Smoke Signals

☐ Flashlight

☐ Food

☐ Paddles

☐ Water

☐ Others

☐ Anchor

☐ Raft or Dinghy

☐ EPIRB

5. Radio ☐ yes ☐ no Type _____ Freqs. _____

6. Automobile License: _____

Type _____ Trailer License _____

Color _____ and make of auto _____

Where parked _____

7. Persons aboard:

Name

Age

Address & Telephone No.

8. Do any of these persons aboard have a medical problem? ☐ yes ☐ no

If yes, what? _____

9. Trip Expectations: Leave at _____ From _____

Going to _____ expect to return by _____ (time)

and not later than _____

10. Any other pertinent info. _____

11. If not returned by _____ (time) call the COAST GUARD, or (local authority) _____

12. Telephone numbers _____

Attachment G

Material Safety Data Sheets

Section 1 - Chemical Product and Company Identification

54

Material Name: Polychlorinated Biphenyls (PCBs)

CAS Number: 1336-36-3

Chemical Formula: Unspecified or Variable

Structural Chemical Formula: $(C_{12}H_{10-x}Cl_x)$

Synonyms: AROCLOR; AROCLOR 1221; AROCLOR 1232; AROCLOR 1242; AROCLOR 1248; AROCLOR 1254; AROCLOR 1260; AROCLOR 1262; AROCLOR 1268; AROCLOR 2565; AROCLOR 4465; AROCLOR 5442; 1,1'-BIPHENYL; CHLORO DERIVS; BIPHENYL; POLYCHLORO-; CHLOPHEN; CHLOREXTOL; CHLORINATED BIPHENYL; CHLORINATED DIPHENYL; CHLORINATED DIPHENYLENE; CHLORO 1,1-BIPHENYL; CHLORO 1,1-BIPHENYL-; CHLORO BIPHENYL; CLOPHEN; CLOPHEN A 60; DYKANOL; EPA PESTICIDE CHEMICAL CODE 017801; FENCOLOR; FENCOLOR 42; INERTEEN; KANECHLOR; KANECHLOR 300; KANECHLOR 400; MONTAR; MONTER; NOFLAMOL; PCB; PCBs; PHENOCHLOR; PHENOCOLOR; POLYCHLORINATED BIPHENYL; POLYCHLORINATED BIPHENYLS; POLYCHLORINATED BIPHENYLS (PCB'S); POLYCHLOROBIPHENYL; PYRALENE; PYRANOL; SANTOTHERM; SANTOTHERM FR; SOVOL; THERMINOL; THERMINOL FR-1

General Use: Used as dielectric fluids in transformers and capacitors. Prior to 1972, were used as hydraulic and other industrial fluids (e.g., in vacuum pumps, as lubricants and cutting oils), in paints, inks and fire retardants.

Also used in heat transfer systems; gas-transmission turbines; carbonless reproducing paper; adhesives; as plasticizer in epoxy paints; fluorescent light ballasts; wax extenders; coolants; dedusting agents; pesticide extenders; surface treatment and coatings; sealants; caulking material.

This is one of a group of once widely used industrial chemicals whose high stability contributed both to their commercial usefulness and the long term deleterious environmental health effects. Consequently their use has been phased out. Their manufacture in the U.S.A. was discontinued in 1977.

Section 2 - Composition / Information on Ingredients

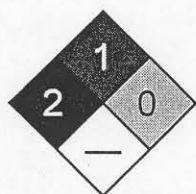
Name	CAS	%
polychlorinated biphenyls (PCB's)	1336-36-3	100

OSHA PEL
No data found.

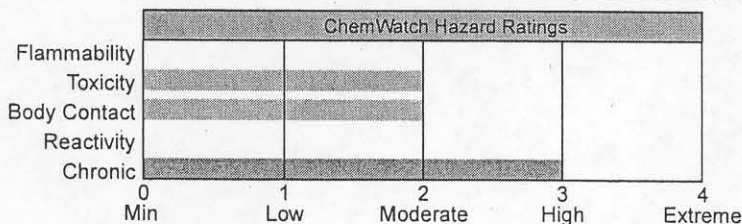
NIOSH REL
No data found.

ACGIH TLV
No data found.

Section 3 - Hazards Identification



Fire Diamond



HMIS	
2	Health
1	Flammability
0	Reactivity

ANSI Signal Word

Warning!

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Oily liquid, white crystalline solid, or hard resin. Severely irritating. Suspect cancer hazard. Chronic: chloracne, GI disturbances, neurological symptoms, liver enlargement, menstrual changes, bronchitis. Possible reproductive and teratogenic effects.

Potential Health Effects

Target Organs: skin, liver, eyes, mucous membranes, respiratory system

Primary Entry Routes: inhalation, skin contact, ingestion

Acute Effects

Inhalation: Not normally a hazard due to nonvolatile nature of product. Inhalation of vapor is more likely at higher than normal temperatures.

The vapor/mist is discomforting and may be extremely toxic if inhaled.

Eye: The vapor/liquid is moderately discomforting and may be harmful to the eyes.

Skin: The liquid is harmful to the skin, it is rapidly absorbed and is capable of causing skin reactions.

Exposure to material may result in a dermatitis, described as chloracne, a persistent acneiform characterized by comedones (white-, and black- heads), keratin cysts, and inflamed papules with hyperpigmentation and an anatomical distribution frequently involving the skin under the eyes and behind the ears. It occurs after acute or chronic exposure to a variety of chlorinated aromatic compounds by skin contact, ingestion or inhalation and may appear within days and months following the first exposure. Other dermatological alterations including hypertrichosis (the growth of excess hair), an increased incidence of actinic or solar elastosis (the degeneration of elastic tissue within muscles or loss of dermal elasticity produced by the effects of sunlight), and Peyrone's disease (a rare progressive scarring of the penile membrane).

Ingestion: Considered an unlikely route of entry in commercial/industrial environments.

The material is moderately discomforting to the gastrointestinal tract and may be harmful if swallowed in large quantity.

Ingestion may result in nausea, pain, vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

Digestion may lead to nausea, vomiting, abdominal pain, anorexia, jaundice and liver damage, coma and death.

Headache, dizziness, lethargy, depression, nervousness, loss of libido, muscle, joint pains may be found.

Symptoms appear after a latent period of 5 to 6 months.

PCB's may appear in breast milk of exposed mothers and in newborn infants.

Carcinogenicity: NTP - Class 2B, Reasonably anticipated to be a carcinogen, sufficient evidence of carcinogenicity from studies in experimental animals; IARC - Group 2A, Probably carcinogenic to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Class B2, Probable human carcinogen based on animal studies; MAK - Not listed.

Chronic Effects: People occupationally exposed to PCB's have relatively high PCB residue levels in blood plasma. Symptoms include chloracne dermatitis and degreasing the skin, pigmentation of skin and nails, excessive eye discharge, swelling of eyelids, transient visual disturbances, distinctive hair follicles, edema of the face and hands. In common with other polyhalogenated aromatic hydrocarbons, the chlorinated biphenyls exhibit dioxin-like behavior. Polyhalogenated aromatic hydrocarbons (PHAHs) comprise two major groups.

The first group represented by the halogenated derivatives of dibenzodioxins (the chlorinated form is PCDD), dibenzofurans (PCDF) and biphenyls (PCB) exert their toxic effect (as hepatotoxicants, reproductive toxicants, immunotoxicants and procarcinogens) by interaction with a cytosolic protein known as the Ah receptor. In guinea pigs the Ah receptor is active in a mechanism which "pumps" PHAH into the cell whilst in humans the reverse appears to be true. This, in part, may account for species differences often cited in the literature. This receptor exhibits an affinity for the planar members of this group and carries these to the cellular nucleus where they bind, reversibly, to specific genomes on DNA.

This results in the regulation of the production of certain proteins which elicit the toxic response. The potency of the effect is dependent on the strength of the original interaction with the Ah receptor and is influenced by the degree of substitution by the halogen and the position of such substitutions on the parent compound.

The most potent molecule is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) while the coplanar PCBs (including mono-ortho coplanars) possess approximately 1% of this potency. Nevertheless, all are said to exhibit "dioxin-like" behavior and in environmental and health assessments it has been the practice to assign each a TCDD-equivalence value.

The most subtle and important biological effects of the PHAHs are the effects on endocrine hormones and vitamin homeostasis. TCDD mimics the effect of thyroxine (a key metamorphosis signal during maturation) and may disrupt patterns of embryonic development at critical stages. Individuals from exposed wildlife populations have been observed to have altered sexual development, sexual dysfunction as adults and immune system suppression.

Immunotoxic effects of the PHAHs (including the brominated congener, PBB) have been the subject of several studies. No clear pattern emerges in human studies however with T-cell numbers and function (a blood marker for immunological response) increasing in some and decreasing in others.

Three incidences have occurred which have introduced abnormally high levels of dioxin or dioxin-like congeners to humans. The explosion at a trichlorophenol-manufacturing plant in Seveso, Italy distributed TCDD across a large area of the country-side, whilst rice-oil contaminated with heat-transfer PCBs (and dioxin-like contaminants) has been consumed by two groups, on separate occasions (one in Yusho, Japan and another in Yu-cheng, Taiwan). The only symptom which can unequivocally be related to all these exposures is the development of chloracne, a disfiguring skin condition, following each incident. Contaminated oil poisonings also produced eye-discharge, swelling of eyelids and visual disturbances. The Babies born up to 3 years after maternal exposure (so-called "Yusho-babies") were characteristically brown skinned, colored gums and nails and (frequently) produced eye-discharges. Delays in intellectual development have been noted. It has been estimated that Yu-cheng patients consumed an average level of 0.06 mg/kg body weight/day total PCB and 0.0002 mg/kg/day of PCDF before the onset of symptoms after 3 months. When the oil was withdrawn after 6 months they had consumed 1 gm total PCB containing 3.8 mg PCDF.

Preliminary data from the Yusho cohort suggests a six-fold excess of liver cancer mortality in males and a three-fold excess in women.

Recent findings from Seveso indicate that the biological effects of low level exposure (BELLEs), experienced by a cohort located at a great distance from the plant, may be hormetic, i.e. may be protective AGAINST the development of cancer.

TCDD induces carcinogenic effects in the laboratory in all species, strains and sexes tested. These effects are dose-related and occur in many organs.

Exposures as low as 0.001 ug/kg body weight/day produce carcinoma.

Several studies implicate PCBs in the development of liver cancer in workers as well as multi-site cancers in animals.

The second major group of PHAH consists of the non-planar PCB congeners which possess two or more ortho-substituted halogens. These have been shown to produce neurotoxic effects which are thought to reduce the concentration of the brain neurotransmitter, dopamine, by inhibiting certain enzyme-mediated processes.

The specific effect elicited by both classes of PHAH seems to depend on the as much on the developmental status of the organism at the time of the exposure as on the level of exposure over a lifetime.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor.

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water.

Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water).

Wash affected areas thoroughly with water (and soap if available).

Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center. DO NOT induce vomiting. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. Give water (or milk) to rinse out mouth. Then provide liquid slowly and as much as casualty can comfortably drink. Transport to hospital or doctor without delay.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Treat symptomatically. If large amounts are ingested, gastric lavage is suggested. For splash in the eyes, a petrolatum-based ophthalmic ointment may be applied to the eye to relieve the irritating effects of PCBs.

If electrical equipment arcs over, PCB dielectric fluids may decompose to produce hydrogen chloride (HCl), a respiratory irritant. [Monsanto] Preplacement and annual medical examinations of workers, with emphasis on liver function, skin condition, reproductive history, is recommended.

Section 5 - Fire-Fighting Measures

Flash Point: > 141 °C

Autoignition Temperature: 240 °C

LEL: Not applicable

UEL: Not applicable

Extinguishing Media: Foam. Alcohol stable foam.

Dry chemical powder.

General Fire Hazards/Hazardous Combustion Products: Noncombustible liquid.

POLLUTANT -contain spillage.

Decomposes on heating and produces acrid black soot and toxic fumes of aldehydes, hydrogen chloride (HCl), chlorides and extremely toxic polychlorinated dibenzofuran (PCDF), polychlorinated dibenzodioxin (PCDD).

Fire Incompatibility: Reacts vigorously with chlorine (Cl₂).

Fire-Fighting Instructions: POLLUTANT -contain spillage. Noncombustible.

Clear area of personnel and move upwind.

Contact fire department and tell them location and nature of hazard.

Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways.

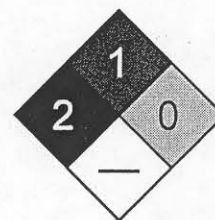
Use fire fighting procedures suitable for surrounding area.

Cool fire-exposed containers with water spray from a protected location.

Avoid spraying water onto liquid pools.

If safe to do so, remove containers from path of fire.

Equipment should be thoroughly decontaminated after use.



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: POLLUTANT -contain spillage. Clean up all spills immediately.

Environmental hazard - contain spillage.

Avoid breathing vapors and contact with skin and eyes.

Wear protective clothing, impervious gloves and safety glasses.

Contain spill with sand, earth or vermiculite.

Wipe up and absorb small quantities with vermiculite or other absorbent material.

Place spilled material in clean, dry, sealable, labeled container.

Large Spills: POLLUTANT -contain spillage. Clear area of personnel.

Contact fire department and tell them location and nature of hazard.

Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways.

Stop leak if safe to do so.

Contain spill with sand, earth or vermiculite.

Collect recoverable product into labeled containers for recycling.

Absorb remaining product with sand, earth or vermiculite.

Collect residues and seal in labeled drums for disposal.

After clean-up operations, decontaminate and launder all protective clothing and equipment before storing and reusing.

If equipment is grossly contaminated, decontaminate and destroy.

If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Do not allow clothing wet with material to stay in contact with skin Use good occupational work practices. Observe manufacturer's storing and handling recommendations.

Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Avoid all personal contact, including inhalation.

Wear protective clothing and gloves when handling containers.

Avoid physical damage to containers.

Use in a well-ventilated area and Use only in completely enclosed system.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Wash hands with soap and water after handling.

Work clothes should be laundered separately: NOT at home.

Recommended Storage Methods: Packaging as recommended by manufacturer.

Check that containers are clearly labeled.

Metal can or metal drum or Steel drum with plastic liner.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Provide adequate ventilation in warehouse or closed storage areas.

If inhalation risk of overexposure exists, wear NIOSH-approved organic-vapor respirator.

In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus.

Personal Protective Clothing/Equipment

Eyes: Safety glasses with side shields; chemical goggles.

Full face shield.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Impervious gloves or Viton gloves or Polyethylene gloves or PVC gloves.

Protective footwear.

Other: Impervious protective clothing. Overalls. Impervious apron.
Eyewash unit.
Ensure there is ready access to a safety shower.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Clear, colorless to yellow-green, mobile oily to viscous liquid, or sticky to hard resin, or white crystalline solid, depending on degree of chlorination. Slightly soluble in glycerol and glycols. Soluble in organic solvents and lipids. Viscosity range: 71 - 2500 Saybolt unit sec. at 38 °C. PCBs are resistant to chemical and biological degradation and because of their solubility in fats and oils they tend to be concentrated in living organisms. The highly chlorinated PCBs are retained in animal's bodies longer and seems to delay the excretion of the lower chlorinated PCB's. They have become widely dispersed in the world-wide environment and in the food-chain since their introduction in 1929. They are now recognized internationally to be a major environmental pollutant, their persistence causing ecological damage via water pollution. Consequently loss of PCBs to the environment is to be avoided at all costs.

Physical State: Liquid

pH: Not applicable

Vapor Pressure (kPa): Negligible

pH (1% Solution): Not applicable.

Formula Weight: 188.66 - 395

Boiling Point Range: 340 °C (644 °F) to 375 °C (707 °F)

Specific Gravity (H₂O=1, at 4 °C): 1.18 - 1.8

Decomposition Temperature (°C): 375-550

Water Solubility: Solubility in water extremely low

Evaporation Rate: Non Vol. at 38 °C

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Avoid storage with oxidizers. Segregate from chlorine.

Avoid contamination of water, foodstuffs, feed or seed.

Section 11 - Toxicological Information

TOXICITY

Oral (human) LD₅₀: 500 mg/kg

Oral (rat) LD₅₀: 3980 mg/kg

See NIOSH, RTECS TQ1350000, for additional data.

IRRITATION

Nil reported

Section 12 - Ecological Information

Environmental Fate: PCBs are mixtures of different congeners of chlorobiphenyl and the relative importance of the environmental fate mechanisms generally depends on the degree of chlorination. In general, the persistence of PCBs increases with an increase in the degree of chlorination. Mono-, di- and trichlorinated biphenyls (Aroclor 1221 and 1232) biodegrade relatively rapidly, tetrachlorinated biphenyls (Aroclors 1016 and 1242) biodegrade slowly, and higher chlorinated biphenyls (Aroclors 1248, 1254, and 1260) are resistant to biodegradation. Although biodegradation of higher chlorinated congeners may occur very slowly on an environmental basis, no other degradation mechanisms have been shown to be important in natural water and soil systems; therefore, biodegradation may be the ultimate degradation process in water and soil.

If released to soil, PCBs experience tight adsorption with adsorption generally increasing with the degree of chlorination. PCBs will generally not leach significantly in aqueous soil systems; the higher chlorinated congeners will have a lower tendency to leach than the lower chlorinated congeners. In the presence of organic solvents PCBs may leach quite rapidly through soil. Vapor loss from soil surfaces appears to be an important fate mechanism with the rate of volatilization decreasing with increasing chlorination. Although the volatilization rate may be low, the total loss by volatilization over time may be significant because of persistence and stability. Enrichment of the low Cl PCBs occurs in the vapor phase relative to the original Aroclor; the residue will be enriched in the PCBs containing high Cl content.

If released to water, adsorption to sediment and suspended matter will be an important fate process; PCB concentrations in sediment and suspended matter have been shown to be greater than in the associated water column. Although adsorption can immobilize PCBs (especially the higher chlorinated congeners) for relatively long periods of time, eventual resolution into the water column has been shown to occur. The PCB composition in the water will be enriched in the lower chlorinated PCBs because of their greater water solubility, and the least water soluble PCBs (highest Cl content) will remain adsorbed. In the absence of adsorption, PCBs volatilize relatively rapidly from water. However, strong PCB adsorption to sediment significantly competes with volatilization, with the higher chlorinated PCBs having longer half-lives than the lower chlorinated PCBs. Although the resulting volatilization rate may be low, the total loss by volatilization over time may be significant because of persistence and stability. PCBs have been shown to bioconcentrate significantly in aquatic organisms. If released to the atmosphere, PCBs will primarily exist in the vapor-phase; the tendency to become associated with the particulate-phase will increase as the degree of chlorination of the PCB increases. The dominant atmospheric transformation process is probably the vapor-phase reaction with hydroxyl radicals which has estimated half-lives ranging from 12.9 days for monochlorobiphenyl to 1.31 years for heptachlorobiphenyl. Physical removal from the atmosphere, which is very important environmentally, is accomplished by wet and dry deposition.

Ecotoxicity: Aquatic toxicity: 0.278 ppm/96 hr/bluegill/TLm/fresh water 0.005 ppm/336-1080 hr/pinfish/TLm/salt water; Waterfowl toxicity: LD₅₀ 2000 ppm (mallard duck); Food chain concentration potential: High

Henry's Law Constant: 5×10^{-5}

BCF: bioconcentrate in tissue

Biochemical Oxygen Demand (BOD): very low

Soil Sorption Partition Coefficient: $K_{oc} = 510$ to 1.33×10^4

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible. Consult manufacturer for recycling options.

Follow applicable federal, state, and local regulations.

Due to their environmental persistence and potential health hazards, PCBs cannot be disposed of in landfills or dumped at sea. The only environmentally acceptable method for the disposal of PCBs is by high temperature incineration.

All wastes and residues containing PCB's (e.g., wiping cloths, absorbent material, used disposable protective gloves, contaminated clothing, etc.) should be collected, placed in proper containers, labelled and disposed of in accordance with applicable regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: POLYCHLORINATED BIPHENYLS

Additional Shipping Information: PCB'S

Hazard Class: 9

ID No.: 2315

Packing Group: II

Label: Miscellaneous Dangerous Goods[9]

Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4), per CWA Section 307(a) 1 lb (0.454 kg)

SARA 40 CFR 372.65: Listed

SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

Attachment H

Incident/Near-Miss Investigation Report

		Incident / Near-Miss Investigation Report	
<input type="checkbox"/> OSHA Recordable	<input type="checkbox"/> First Aid Injury	<input type="checkbox"/> Fire	Date of Incident:
<input type="checkbox"/> Lost Workday Injury	<input type="checkbox"/> Vehicle Accident	<input type="checkbox"/> Spill / Leak	
<input type="checkbox"/> Restricted Duty Injury	<input type="checkbox"/> Equipment Damage	<input type="checkbox"/> Near Miss	Incident Number:
Every employee injury, accident, and near miss must be reported within 24 hours of the injury. If the incident results in hospitalization, an immediate report must be made by telephone to the Project Manager and the Health and Safety Officer.			
Project Information			
Project Name:		Project #	
Location of Incident:			
Employee			
Name:		Employee Number:	
Employment Status: <input type="checkbox"/> Regular <input type="checkbox"/> Part Time		How long in present job?	
Injury or Illness Information			
Where did the incident / near miss occur? (number, street, city, state, zip):			
Employee's specific activity at the time of the incident / near miss:			
Equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the equipment employee struck against or that struck the employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):			
Describe the specific injury or illness (e.g., cut, strain, fracture, etc.):			
Body part(s) affected (e.g., back, left wrist, right eye, etc.):			
Name and address of treatment provider (e.g., physician or clinic):			Phone No.:
If hospitalized, name and address of hospital:			Phone No.:
Date of injury or onset of illness: / /		Time of event or exposure: <input type="checkbox"/> AM <input type="checkbox"/> PM	
Did employee miss at least one full shift's work? <input type="checkbox"/> No <input type="checkbox"/> Yes, 1st date absent (MM/DD/YYYY) / /			
Has employee returned to work? <input type="checkbox"/> Regular work <input type="checkbox"/> Restricted work <input type="checkbox"/> No <input type="checkbox"/> Yes, date returned (MM/DD/YYYY) / /			
To whom reported:		Other workers injured / made ill in this event? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Description of Incident / Near Miss: (Describe what happened and how it happened.)			
Motor Vehicle Accident (MVA)		Company Vehicle?	<input type="checkbox"/> Yes <input type="checkbox"/> No

		Incident / Near-Miss Investigation Report							
Accident Location (street, city, state)									
Vehicle Towed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Other Vehicle?	<input type="checkbox"/> Yes <input type="checkbox"/> No	# Vehicles Towed:		# of Injuries:			
Spill									
Material Spilled:		Quantity:				Source:			
Agency Notifications:									
Cost of Incident \$									
Third Party Incidents									
Name of Owner:		Address:				Telephone:			
Description of Damage:									
Witness Name:		Address:				Telephone:			
Witness Name:		Address:				Telephone:			
#	Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)								
1									
2									
3									
4									
5									
Root Cause(s) Analysis (RCA):									
1. Lack of skill or knowledge. 5. Correct way takes more time and / or requires more effort.									
2. Lack of or inadequate operational procedures or work standards. 6. Short-cutting standard procedures is positively reinforced or tolerated.									
3. Inadequate communication of expectations regarding procedures or work standards. 7. Person thinks there is no personal benefit to always doing the job according to standards.									
4. Inadequate tools or equipment. 8. Uncontrollable.									
#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring				Person Responsible	Due Date	Closure Date	
Investigation Team Members									
Name					Job Title		Date		
Results of Solution Verification and Validation									

	Incident / Near-Miss Investigation Report	
Reviewed By		
Name	Job Title	Date
	Project Manager	
	Health and Safety Reviewer	

Attachment I

Air Monitoring Log

Air Monitoring Log

Project:	Date:
Monitoring Instruments:	
Air Monitor:	Activity:
Level of Protection:	

Air Monitor:

Comments

[illegible]

Attachment J

Health and Safety Inspection Form

Health and Safety Inspection Form

Project Name:		Date:		
Project Number:		Location:		
Prepared By:		Project Manager:		
Auditor:		HSS On Site:		
	YES	NO	N/A	COMMENTS
GENERAL				
Is the HASP on site?				
Is the HASP finalized and approved?				
Is the OSHA poster displayed?				
Are emergency telephone numbers posted?				
Is emergency eyewash immediately available?				
Is an emergency shower immediately available?				
Are emergency notification means available (radio, telephone)?				
Is a first-aid kit immediately available?				
Is the first-aid kit adequately stocked?				
Is there a proper sanitation facility on site?				
DOCUMENTATION AND RECORDKEEPING				
Are only personnel listed and approved in the HASP on site?				
Are all personnel properly trained? (Check company-issued wallet cards.)				
Is the daily field log kept by the Site Manager?				
Are levels of PPE recorded?				
Are contaminant levels recorded?				
Are site surveillance records kept by HSS?				
Is a copy of current fit test records on site?				
Are calibration records maintained for air monitoring equipment?				
Are accident / incident forms on site?				
Are field team review sheets signed?				
Are additional hospital route directions available?				
Is the visitors' logbook being accurately maintained?				
Are MSDSs available for all chemicals on site?				
Are HASP revisions recorded?				
Is the first-aid kit inspected weekly?				
Are daily safety meetings held?				
Are emergency procedures discussed during safety meetings?				

Health and Safety Inspection Form

	YES	NO	N/A	COMMENTS
EMERGENCY RESPONSES				
Is a vehicle available on site for transportation to the hospital?				
Are fire extinguishers on site and immediately available at designated work areas?				
Is at least one person trained in CPR and first aid on site at all times during work activities?				
Do all personnel know who is trained in CPR / first aid?				
PERSONAL PROTECTIVE EQUIPMENT (PPE)				
Is proper PPE being worn as specified in HASP?				
Level of PPE being worn.				
Is PPE adequate for work conditions?				
If not, give reason.				
Upgrade/downgrade to PPE level.				
Does any employee have facial hair that would interfere with respirator fit?				
If yes, willing to shave, as necessary?				
Fit-tested within the last year? (Documentation present)				
If Level B, is a back-up / emergency person suited up (except for air)?				
Does the HSS periodically inspect PPE and equipment?				
Is the PPE not in use properly stored?				
Is all equipment required in the HASP on site?				
Properly calibrated?				
In good condition?				
Used properly?				
Other equipment needed?				
List.				
Is monitoring equipment covered with plastic to minimize contamination?				
PERSONNEL AND EQUIPMENT DECONTAMINATION				
Is the decontamination area properly designated?				
Is appropriate cleaning fluid used for known or suspected contaminants?				
Are appropriate decontamination procedures used?				
Are decontamination personnel wearing proper PPE?				
Is the equipment decontaminated?				

Health and Safety Inspection Form

	YES	NO	N/A	COMMENTS
PERSONNEL AND EQUIPMENT DECONTAMINATION (continued)				
Are sample containers decontaminated?				
Are disposable items replaced as required?				
WORK PRACTICES				
Was proper collection and disposal of potentially contaminated PPE performed?				
Was proper collection and disposal of decontamination fluid performed?				
Is water available for decontamination?				
Is the buddy system used?				
Is equipment kept off drums and the ground?				
Is kneeling or sitting on drums or the ground prohibited?				
Do personnel avoid standing or walking through puddles or stained soil?				
Are work zones established?				
If night work is conducted, is there adequate illumination?				
Is smoking, eating, or drinking in the exclusion or CRZ prohibited?				
To the extent feasible, are contaminated materials handled remotely?				
Are contact lenses not allowed on site?				
Is entry into excavations not allowed unless properly shored or sloped?				
Is a competent person on site during excavation?				
Are all unusual situations on site listed in HASP?				
If not, when?				
Action taken?				
HASP revised?				
CONFINED SPACE ENTRY				
Are employees trained according to 1910.146 – Confined Space Entry?				
Are all confined spaces identified? If not, list:				
Is all appropriate equipment available and in good working order?				
Is equipment properly calibrated?				
Are confined space permits used?				
Are confined space permits completely and correctly filled out?				

Attachment K

Daily Safety Meeting Log

Safety Meeting Log Incident / Near-Miss Investigation Report

Project:	Location:
Date / Time:	Activity:
1. Work Summary	
2. Physical / Chemical Hazards: Has JSA been reviewed/modified to address changing conditions?	
3. Protective Equipment/Procedures	
4. Emergency Procedures	
Is there anyone with any medical conditions that they would like the team to know about? For example: Medic Alert, Allergic to bee stings, nitro for chest pains, etc.	
Location of medical equipment: fire extinguishers, first aid kit, route to hospital, auto-injectors, etc.	
5. Signatures of Attendees	